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Thausing's Life of Albert Dürer.

THOUGH we may regret that so much of the best artistic biography in our language consists in translations, and not in original work, we are glad to have in any form a more full and learned life of Albert Dürer than the slighter biographies existing in our language, especially as in England, except among a few persons who have given special study to him and his works, there hangs about his name and life a certain degree of glamour and mystery; he is a great name, concerning whom people know very little. His fine impressive head, with its masses of curling hair, coupled with the character of many of his designs, suggests vaguely the idea of something very romantic in his life and character, an idea which his detailed biography does not bear out, his character and social circumstances having been, on the whole, matter-of-fact enough. We have no translator's name to the biography before us;* it is "edited" by the Secretary of the Royal Academy, from whose preface it appears that the translation has been a work of co-operation, having been rendered a difficult task by "the abstruse and often involved style peculiar to much of German literature," and the number of technical terms which had to be represented as nearly as possible by English equivalents. Dr. Thausing's work has attained a high position in German artistic biography, having been the result of much time and careful study, by a writer who had special opportunities of studying Dürer's paintings, and who has also made Dürer's letters and personal traits, as far as they are on record, a matter of careful inquiry. The translation reads well and smoothly, and, if it correctly represents the original, may be called a very successful specimen of the difficult art of reproducing a book in another language so as to be at the same time accurate in its representation of the original meaning, and readable as an English book.

The introductory chapter goes into some of the social and intellectual conditions under which German art was carried on just before the days of Dürer. According to Herr Thausing, Nuremberg, seated between the essentially priestly city of Cologne and the essentially regal, or rather imperial, city of Prague, escaped the extreme influence of either form of government, and was pre-eminently the free city of a self-reliant higher community, who were not bound to carry out art in forms calculated to please and satisfy either priestly or courtly influences. They took their own views, and followed freely their own paths, and the work which they most especially aimed at, perhaps rather instinctively than deliberately, was to give to the human figure and countenance the expression of the inner life of the time, not merely to represent them with outward correctness. "The importance of Van Eyck's innovation," says the author, "consisted chiefly in two things: the introduction of landscape into pictures, and the development of individuality of form and expression in the human countenance:" and he comments on the radical distinction between early classic art, which modelled the naked human body in different attitudes expressive of action without making any alteration in the expression of the features, and the tendency of modern art, which began with the study of the human countenance, and occupied itself with the expression of the face in the first instance, and the figure only in a secondary and, for a long time, in a tentative manner. This tendency to regard what may be called spiritual expression as of the first importance in painting, Herr Thausing seems to regard as especially developed in Nuremberg in consequence of the free life there which disposed men to take up and work out new ideas, and the strongly developed moral feeling and earnestness which characterised the life of the people and made itself felt in their art. This earnestness, it is true, is to be looked for beneath rather than on the surface; for the superficial life of the Nuremberg of Albert Dürer was coarse enough in its minor characteristics, and Herr Thausing's life brings out a side of Dürer's manner and character which will to many seem rather a startling contrast to the ideas commonly associated with his name as that of a great religious painter. But beneath this superficial roughness there was a substratum of seriousness which comes out in the paintings of Dürer, though not in his letters. "Without being strictly ecclesiastical, the school of Nuremberg was deeply religious, and without renouncing the truth, it remained elevated and full of warm feeling. It did not certainly attain to purely formal beauty according to modern ideas, or did so only conditionally, for it aimed higher. German genius is not satisfied with mere external charms if it cannot bring them into harmony with the aspect of the inner life. The idealism of German painting consists in this struggle to give expression to deep and mysterious inward feeling." It may be said that there has been in German art of every kind rather too little of external beauty and too much of "inner consciousness," and this is certainly to some extent the case with Dürer, whose figures, at all events, are seldom, in the material sense, beautiful, though he often shows great richness of effect and fine design in the execution of accessories.

Another influence on the German art of Dürer's time existed, Herr Thausing considers, in the position which just then began to be taken by wood and copper engraving as a means of popularising art, and even of conveying instruction. The little opportunity afforded for wall painting, or even easel-painting, on a large scale in Germany, as compared with Italy, drove the German artists very much in the direction of engraving, and the method of the manipulation carried on in line engraving insensibly influenced their style even in painting. But a more important result of the growth of engraving lay in the power which it gave the artist of appealing to a large public, more especially in illustrated books, wherein, in many cases, the illustrations assumed a great importance in comparision with the text, which was little more than an excuse for them. Thus, as Herr Thausing puts it, "labouring for a great impersonal public contributed materially to raise the artisan into the artist. By appealing to it he could relieve himself from any pressure which might be put upon him by his employer. The painter could venture to follow out his own inspirations in his designs for engravings on copper and wood, sure that a congenial people would understand them. The fact that he usually was at the same time his own printer and publisher must also have been favourable to his worldly prosperity. For the security of the property thus created he placed a mark or monogram upon his work, and a well-regulated community, such as Nuremberg, watched carefully over the inviolability of these rights. The monogram at first was only intended to indicate that the author had an exclusive right of sale. It was the modern conception of personality, the thirst for fame characteristic of the Renaissance, which added to this meaning the idea of an intellectual property." We confess we should take this statement *cum grano*. The monogram being placed so conspicuously as it usually was by Dürer and others may no doubt have been, to some extent, a matter of business, a trade-mark, and Herr Thausing's suggestion to that effect certainly throws an interesting new light on the subject, and on our notion of the relations of Dürer and his contemporaries with their public; but that there was no idea of intellectual property in the design, and no desire for intellectual representation in connexion with it, we should very much doubt. It is true that the Renaissance gave a great impulse to the desire for fame, and in regard to architecture it introduced a personal element which had before lain almost entirely dormant; but we do not imagine there has been any time in which art worth speaking of has been produced, in which there was not, on the part of the artist, the desire for personal fame and recognition. The feeling is innate in human nature, and perhaps in artistic human nature above all.

Without attempting to go through the details of the life of the painter as presented in these two volumes, we may touch upon some of the points in regard to which Herr Thausing appears to have thrown special light on the circumstances, character, and career of Albert Dürer

* Albert Dürer: his Life and Works. By Moriz Thausing, Professor in the University of Vienna, and Keeper of the Albertina Collection. Translated from the German. Edited by Fred. A. Eaton, M.A., Oxon, Secretary of the Royal Academy. With illustrations. London: John Murray. 1882.

The first of these is in reference to his domestic circumstances. It has become an accepted belief that Dürer suffered much from a tyrannical and scolding wife. Herr Thausing is very anxious to rescue the wife of Dürer from this reproach. There is evidence, at least, that it was a marriage of affection on Durer's part, and that the lady possessed (for a Dutch lady) no inconsiderable personal charms. According to our author, the whole story as to her Xantippe-like character rests upon a single letter of a certain Pirkheimer, a respectable and wealthy citizen of Nuremberg, written shortly after Dürer's death. Pirkheimer had been a friend and constant correspondent of Dürer's, and must have known about as much of his private life as any one could who did not live actually in the family. His accusations against the wife are given in plain and unmeasured terms, and denounce her as having shortened Dürer's life by her ill-temper. The explanation given by the author is that Pirkheimer was a sour-tempered old virtuoso, who was chagrined against Frau Dürer for having given away or otherwise disposed of certain curiosities among the relics of Dürer, which he, Pirkheimer, had coveted. It appears that there was a taste just then in Nuremberg for the possession of stags' antlers, which formed the analogy to the blue china of our own day: and Dürer had a prrticularly fine pair which Pirkheimer had wished to purchase. That Pirkheimer was very enthusiastic on this subject of antlers is evident enough. He says he would have given anything for a fine pair, and "Albert Dürer had one beautiful pair, which I should dearly have liked, but she (Dürer's wife) has secretly given them away, together with other beautiful things, for next to nothing." This statement, it may be observed, discredits another charge of Pirkheimer's against Agnes Dürer,—that she was grasping and avaricious,—and does, therefore, tend to throw some doubt upon the correctness and fairness of his statements. At the same time, it appears to us that it is rather a large demand to make upon the reader's credulity, that he should translate all this testy but respectable gentleman's very emphatic charges against Dürer's wife for ill-temper, into vexation at not getting something which he wanted from among Dürer's relics. The vexation may have tended to induce him to air his feelings about her, but it hardly seems very probable that it would have led him to actually inventing charges which there was no ground for, and we must regard the fact of Albert Dürer's domestic discomfort as still among the probabilities; and the rather as the author admits that there is no extant testimony in favour of the wife's character and temper, to set against Pirkheimer's positive evidence.

In regard to the sources whence Dürer drew his characteristic and strongly-marked style, the author regards him as indebted directly to only one artist, Wolgemut, whose pupil he was, and who had, after considerable absence from his native town, Nuremberg, returned to it with a style much influenced by that of the Van Eycks, and which in its turn influenced his pupil Dürer, who may thus have been regarded as the artistic descendant at second-hand of the Van Eycks. Wolgemut, though his name is little heard of now, had an immense reputation at the time, and a great number of commissions, and there is sufficient evidence adduced by Herr Thausing both that Dürer regarded him with great respect, and that he consciously imitated the style of his master. Dürer's father, as is well known, was a goldsmith, and Dürer was to be brought up to the same craft, and actually learned and worked at it for some time during his boyhood, until his own expressed preference for painting led to his being removed to the studio of Wolgemut, rather unwillingly on the part of his father, who (not unnaturally, perhaps) seems to have grudged the time lost in the goldsmith's work, which was now to be abandoned. It does not appear, however, probable that Dürer's apprenticeship as a goldsmith influenced his style of painting at all, or that he looked upon it as an art in the same category as the art of painting, and which might be practised simultaneously with painting, as some of the great Italian artists evidently regarded it. On the contrary, there is his own direct and written definition of painting as the art of representing things in relief on a flat surface, and which he evidently considered as an art *sui generis*, and of a higher type than any other, although his definition seems to include what is sometimes distinguished as the art of design, on a different footing from painting properly so called; and the evident delight which he took in drawing the rich and bold ornamental accessories frequently found in his engravings seems to show that his interest in this branch of drawing was very great. There is evidence also that he studied perspective systematically, and attached great importance to it.

We must regard Dürer, therefore, as essentially a draughtsman, by his own choice, and, as on the whole, repudiating or passing over what are called the lesser arts. It appears that he occasionally made designs for ornamental objects, or at least sketches, for a facsimile of a design for a fountain is given by Herr Thausing, who expresses great admiration for it. We only see in it a sketch of what would have proved, if executed, a very poor, thin, and ineffective piece of work; and it is certainly remarkable how tame is the hand of the same artist in making a design of this kind, in comparison with his force and freedom in the higher class of design.

In the outset of his career as a painter, or what is now somewhat awkwardly called a "painter-engraver" (i.e., an engraver of designs of his own origination), Dürer must have been not a little influenced by the state of social and religious freedom of Nuremberg in the choice and feeling of some of his earlier subjects. Nuremberg was anti-papistical, and, in fact, opposed to every form of domination which interfered with freedom of thought and freedom of action. The author mentions the audacious and somewhat coarse pictorial satires on the Papacy which were executed by Wolgemut about the time that Dürer was commencing his career as an artist, and were openly published with the artist's signature or "trade-mark" upon them connecting them with his own studio; a course which Herr Thausing thinks would hardly have been possible anywhere at that time except in free and independent and wealthy Nuremberg. He notes as significant the fact that at this very time Dürer was engaged in the same city on his designs in illustration of the Apocalypse, a book from which so much of the more serious satire against the Church of Rome was taken. There is, in fact, without any direct expression of it, a strong underlying Protestantism in these designs. The conventional figures of church saints and hierarchs, which the painters of Italy adopted in obedience to the pervading influence of the ecclesiological idea, are replaced in Dürer's designs by vigorous and almost naturalistic figures, in which he seems to seek to give, in his own peculiar mixture of ideal action with the realistic costume of his own day, the broad force and meaning of the allegory, without bringing it in any special way into the sphere of religious or ecclesiastical painting. This is, perhaps, one of the most noticeable among several points of resemblance between Dürer and Michelangelo; both are, in the treatment of sacred subjects, for the most part so wholly independent of ecclesiastical influence and ecclesiastical feeling, so large and free in their reading of the subject.

One of the most interesting chapters in the Life is that which treats of Dürer's second visit to Venice about 1505. It is suggested that one cause of his wishing to be in Venice about this time was the fact of the rebuilding of the Fondaco dei Tedeschi, the German Exchange, which was ultimately decorated externally by Titian and Giorgione, and in which Dürer might have wished to have a hand. The very idea of Dürer among the Venetian artists is interesting, and suggests all kinds of fancies in regard to the reciprocal influence on each other of the Venetian painters and himself. Dürer had considerable repute in Venice already, but it appears that his work there was chiefly in executing commissions for the German residents, especially an altarpiece for the Church of San Bartolommeo, which was the German church of the city. Dürer complains in one letter to his friend Pirkheimer, however, that it was not very paying work, and that if he had not bound himself to execute this work for the Germans he might have made much more in commissions from the Italians, who, he says, came to see him in such crowds that he was forced sometimes to hide himself. "All the nobles wish me well," he adds, "but few of the painters," a position which does not seem to have been unsatisfactory to Dürer. One of the painters with whom he was, however, on very friendly terms was the aged Bellini, who, having made his reputation and finished his career, could perhaps better afford to look with complacence on the great German rival than could the younger artists of the Venetian school. A story is related concerning him and Dürer, the relater being Dürer himself, that Bellini asked, "as a special mark of affection, for one of the brushes used by Dürer in painting hair. Dürer held out to him a number of ordinary brushes, and told him to choose one, or take them all if he liked. Bellini, thinking Dürer had not understood him, again asked for one of the particular brushes with which, as he thought, Dürer was accustomed to do his fine hair painting. On this Dürer assured him that he used nothing but the ordinary brushes, and to prove it painted on the spot a long lock of woman's hair in his peculiar manner. Bellini is said to have acknowledged to several people afterwards that he would never have believed it if he had not seen it with his own eyes. The story is very characteristic of Dürer, and he was just the man to take pleasure in repeating it."

Dürer, in fact, in spite of the popular idea which his grand and serious countenance, and the melancholy and sombre feeling of much of his work has given rise to, was by no means a grave, serious, or very high-minded man, apart from his art, but was a thorough man of the world, looking carefully after his money-matters, enjoying his fame, fond of dressing, and somewhat vain about his appearance, and given to indulging with his friend Pirkheimer and others in exceedingly coarse and even obscene "chaff." The extent to which this was carried is shown in the joke written in Greek on Pirkheimer's portrait, which is given in its Greek form, but which, as the translator most truly says, could not be translated into English. Of course, these were the ways of the time, and no one would attach too much importance to them; but it is, nevertheless, curious to find how much the realistic portrait of a great artist in his social capacity may differ from the ideal of him which his works would suggest. In his art, he seems at the time we have been last speaking of to have been perfectly assured of his own position and exceedingly independent of any other opinion. He observes in one of his letters from Venice that many painters there stole from his engraved works, and appropriated his ideas, and then afterwards, he adds, "they find fault with it, and say it is not like antique art, and therefore not good." From the indifferent way in which he makes this remark, Dürer seems to have felt himself quite out of the reach of being shaken in his own confidence in himself by any such criticism. He had taken a path of his own, and had full reliance on his being in the right way. The position which he really took in the art is well summed up by the author in a paragraph immediately following that from which the last reference is taken. "After feeling his way long and anxiously between tradition and nature, he had found a language fitted to express the deepest feelings of his soul, and with a mighty effort he drew together within one harmonious circle the opposite poles of that disturbed age, its faith and its knowledge. The full stream of Christian feeling and devotion was poured by him into a thousand new forms, taken from the life, and of which German sentiment alone could appreciate the full depth and meaning. The stepping-stones of Italian Renaissance, the lightly-tied leading-strings of the antique, were discarded and thrown aside, and unaided he reached that perfect and matchless manner of representing scenes of sacred history which has since become typical, and in which the whole modern world has found profit and edification."

MR. C. J. FREAKE, OF SOUTH KENSINGTON.

The *London Gazette* has announced that the Queen has been pleased to direct letters patent to be passed under the Great Seal, granting the dignity of a baronet of the United Kingdom of Great Britain and Ireland unto Charles James Freake, of Cromwell House, in the parish of St. Mary Abbots, Kensington, and Fulwell Park, in the parish of Twickenham, both in the county of Middlesex, Esq.

All who are acquainted with Sir Chas. Freake's long and honourable career, and his many acts of wise liberality, well seconded in these as he has been by Lady Freake, will hear with pleasure of the bestowal of this mark of honour. Personally, as to old and valued friends, we offer them our heartiest good wishes.

THE A B C OF THE ELECTRIC LIGHT.

GALVANIC ELECTRICITY.

Of the countless thousands of wayfarers who pass along the Thames Embankment, over Holborn Viaduct, or through any other London thoroughfare lighted by the electric light, and admire the latest triumphs of electricity in this direction, perhaps not one in a hundred thousand has the remotest notion of the way in which the marvel is accomplished.

The better educated portions of the crowd have a vague idea that the electricity is generated somehow or other by a steam-engine, and their memory very possibly harks back to the days of their boyhood, when they used to be taken to the Polytechnic Institution to see alarming sparks of electricity bred before their eyes by rows of shrieking steam jets; but they are victims of a false analogy. They also know that, like the force that carries their messages to the bounds of civilisation, the electricity that feeds the electric light is conveyed along the streets through wires; but here their knowledge ends. The same remarks may be applied to nearly the whole body of architects, who in their younger days very naturally never thought of paying the slightest attention to the science of electricity, little dreaming that its latest outcome,—a brilliant, cheap, safe, and wholesome illuminating agent,—would one day form an important factor in the art of construction.

Some of the more adventurous of our readers may have determined manfully to "read up the subject," and have consequently dipped into a few books on electricity, but only to find themselves totally bewildered by a confusing mass of words, such as "tension," "potential," "ohm," "cathode," and "rheostat," which most effectually quench their ardent thirst for knowledge. The fact is that manuals of electricity are written either for technical men or for scientific students, who have already gone through a certain amount of training, and not for popular reading.

The principles which govern the production of the electric light are exceedingly simple, although the machinery by which they act is comparatively complicated. The object of the present article is to explain these principles to the unscientific reader in the terms of every-day life. It would, of course, be out of place in a journal like the *Builder* to go very deeply into the matter, or describe in detail the numerous machines and lamps at present in use, but as any intelligent person may understand the principles upon which the steam-engine works without knowing the name and purpose of its every wheel and lever, so let us hope that it may be equally possible to make those who may at any time be called upon to fit up a building with the electric light acquainted with the principles that govern its production.

Electricity as a force was first known to Theophrastus (384-287 B.C.), who found that when yellow amber (*electron*) was rubbed with silk it attracted light substances. As far as the electric light goes, this cardinal fact lay fallow for nearly 2,000 years, until 1708, when a Dr. Wall, an English physician, found that by rubbing a long thick piece of amber with a silk fabric it emitted sparks accompanied by a peculiar crackling. Dr. Wall, therefore, was the first philosopher to produce light by the aid of electricity. The kind of electricity by which he produced these effects differs considerably in its qualities from that generated by either a galvanic battery or a magneto-electric machine; it may, therefore, be dismissed with the remark that its effects are momentary, whereas those of galvanic electricity are constant and continuous. There is no practical analogy, therefore, between Sir William Armstrong's hydro-electric machine at the Polytechnic, which generated electricity by the friction of a jet of steam against the sides of a boxwood tubular plug, and the machines used for working the electric light. The force in both cases is identical, but it is manifested in a different manner. The effects of frictional and galvanic electricity may roughly be compared to those of a gas explosion and a gas engine. In the one case the force of the combustion is spent in a moment, and with terrific violence; in the other, ignition takes place quietly, and the force generated exerts itself continuously. A more homely illustration may be found in a red-hot poker and a foot-warmer. The force is the same, but its origin and effects are different.

There is, perhaps, no more striking instance of the influence of apparently fortuitous circumstances on the progress of science than those which led to the discovery of galvanic electricity. Arago, in his panegyric on Volta, says "this immortal discovery arose in the most immediate and direct manner from a slight cold with which a Bolognese lady was attacked in 1790, for which her physician prescribed,—frog broth!" The lady was the wife of Dr. Galvani, Professor of Anatomy at the University of Bologna. Frogs were provided, killed, skinned, and their hind-quarters chopped off. The cooking of the broth appears to have been carried on in the Professor's private laboratory, and Madame Galvani, who was superintending the operations, was surprised to see the legs of the dead frogs twitch violently every time an assistant took sparks from a frictional electrical machine which stood close by. The lady told her husband, who repeated the experiment, with the same results. At that time Galvani was full of a theory that muscular force was electricity, and he saw in the twitching of the frogs' legs the confirmation of his views. Madame's cold still continued, and frog broth became a standing dish in the Galvani household. On one occasion the frogs' quarters were hung on an *iron* balcony by *copper* hooks, when, to Galvani's astonishment, the muscles again began to quiver, although no electrical machine was near. Galvani immediately jumped to the conclusion that his theory was proved, and that the electricity which moved the dead muscles of the frogs' legs originated in the muscles themselves,—a theory which the gentle old philosopher adhered to most manfully until the hour of his death.

The illustrious Alessandro Volta, who was then Professor of Natural Philosophy at Como, and had already distinguished himself by several capital discoveries connected with frictional electricity, repeated Galvani's experiments, and speedily demolished his theory of muscular electricity by showing that the same effects could be produced without the use of muscular fibre at all by uniting the edges of two dissimilar metals with a piece of damp cloth between, and that the muscle produced electricity, not because it was muscle, but because it was damp.

In 1780 Volta discovered the voltaic or galvanic pile, the venerable father of all the galvanic batteries that have since been invented. It consisted of a number of discs of silver, zinc, and damp cloth piled one upon another in regular order,—silver, zinc, cloth, silver, zinc, cloth, until the column consisted of twenty or thirty pairs of metallic plates with damp cloth between each pair. By connecting the top and bottom plates by two wires Volta obtained all the effects of frictional electricity in a milder but continuous form. Finding that, as the cloth discs became dry the electric current rapidly diminished, Volta tried to obtain the same effect by immersing plates of silver and zinc in water, and succeeded perfectly. His first experiments were tried in coffee-cups, which were arranged in a circular form: hence his first battery as distinguished from his pile was named by him *la couronne de tasses*.

Figure 1 is a section of a single cell of a galvanic battery. Z is a zinc plate with a wire W W attached. C is a similar plate of copper, also with a wire W W attached, both of the plates being immersed in acidulated water, the level of which is shown by the dotted line. This arrangement fulfils the law laid down by Volta, that when two plates of dissimilar metals are immersed in a liquid, and joined by a wire, electricity is generated on the surface of that metal which is the most easily acted upon chemically by the liquid, and flows through the liquid to the other plate which acts as a collector. In fig. 1 the zinc plate Z is more easily acted upon chemically by the acidulated water in the trough, the electricity emitted from its surface being taken up by the copper plate C, the current circulating round and round in the direction of the arrows. If the wires are disconnected the current immediately stops, its flow being thus interrupted.

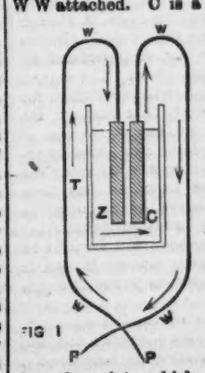


FIG 1

We may learn more of the action of the galvanic battery from a few simple experiments which are within the reach of every one than by pages of explanation.

Place a clean slip of roofing zinc,—say 2 in. by 1 in.,—on the upper part of the tongue, and an iron key or nail underneath the unruly member, taking care not to let the metals touch. As long as the key and the zinc are separated no apparent effect will be produced, but join them and a peculiar tingling sensation will be felt in the tongue, accompanied by a metallic or saline taste, which will be repeated every time the two metals are joined. In this simple experiment lies the whole principle of the production of current or galvanic electricity. The experiment fulfils Volta's conditions. The saliva forms the liquid representing the water in the vessel (fig. 1), and, acting on the zinc more energetically than on the iron, an electric current is set up, which circles round and round from the zinc to the iron through the tongue and saliva, and so back to the zinc again. In passing through the tongue the electricity stimulates the nerves of that organ, and in its passage through the saliva slightly decomposes that liquid and gives rise to the sensations described.

We may vary the experiment by washing the mouth out with strong brine or vinegar, and shall find that the electrical action is more energetic than with plain saliva. The reason of this is that the salt or vinegar acts more strongly on the zinc than the saliva, and the more intense the chemical action the greater the amount of electricity generated.

Repeat the experiment, substituting a silver coin for the iron key, and you will find the electric current still stronger. This change will require a little explanation. It has already been said, and we have found it to be true by experiment, that saliva and salt and water act chemically on zinc, thereby setting up an electric current; but this is also the case in a minor degree with iron, consequently the key sets up an opposition current to the zinc, thereby partly neutralising the effect. Now, the saliva acts still less upon the silver coin than on the iron, so that there is little or no opposition current. If we use gold or platinum the effect is still further increased. The ordinary metals being acted upon in the following order:—Gold, imperceptibly; platinum, scarcely at all; silver, very slightly; copper, slightly; iron, somewhat strongly; zinc, very strongly; magnesium, very strongly indeed.

If we want to make the strongest galvanic pair out of the above metals we should choose gold and magnesium, but as both of these metals are extremely dear, we have to fall back on zinc for the generating plate, and platinum, silver, or copper for the collecting-plate. There is one very cheap substance which, although not a metal, is superior even to gold and platinum as a receiving-plate, and that is the carbon which is found lining the insides of gas-retorts.

To sum up, in order to form a galvanic pair, we must have,—

1. A plate of metal which is easily acted on by water, saliva, brine, or dilute sulphuric acid.
2. A liquid to act on the plate chemically, and so produce an electric current.
3. A plate of carbon platinum, or some metal that is not acted on by the liquid; and
4. A vessel to contain them.

The next step that Volta made was to join the zinc of one vessel with the copper of the next, as shown in fig. 2.

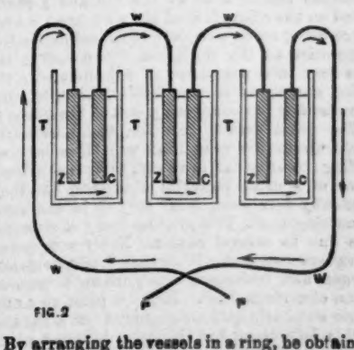


FIG. 2

By arranging the vessels in a ring, he obtained a large increase of power. This arrangement he called *la couronne de tasses*, which was the natural development of his pile of zinc, copper, and cloth discs, a vessel of exciting fluid taking the place of the latter, with a series of sixty such

pairs. Volta found that, holding the end wires in his moistened hands, he experienced a slight shock similar to that produced by a frictional electric machine, and that by holding the ends of the wires very close to each other, he could get a slight spark. Carlisle and Nicholson, two English philosophers, found that the current was capable of decomposing water into its elementary gases, oxygen and hydrogen, the former uniting with the metal of which the wire is composed, the latter escaping in minute bubbles. When platinum terminals were used, both the gases were liberated, oxygen refusing to unite with that noble metal under ordinary circumstances.

The next advance was also made by an Englishman of the name of Cruickshank, who, instead of using separate vessels, used a wooden trough divided by partitions. But none of these philosophers took up the subject with the same enthusiasm as the great Davy, who had just then assumed the direction of the Royal Institution, then newly established. From the chemical effects of the galvanic battery Davy turned his attention to its heating powers. He constructed a gigantic battery, consisting of 150 pairs of zinc and copper plates, 4 in. square, and another series of 50 pairs of zinc and silver plates of the same dimensions. He also provided himself with a third battery of 20 pairs of zinc and copper plates, 13 in. square. With the smaller batteries he produced most interesting results in the way of obtaining sparks of dazzling brilliancy between terminals of brass and other metals. Between charcoal ends it had all the vivid whiteness on a small scale of the arc lights with which we are all now so familiar. When passed through fine wires of steel, iron, platinum, and other conductors of electricity, it rendered them white hot, and even fused them; in other words, he produced our present incandescent lights with metal instead of charcoal. Having obtained such brilliant results with the battery at his command, Davy resolved to construct one on a still larger scale, the plates of which were 2,000 in number, and measured a total surface of 128,000 square inches, or nearly 900 square feet. With this powerful battery he found he could get an arc between the charcoal terminals of his gigantic battery of 4 in. in length, the temperature being enormous. Quartz, sapphires, magnesium, lime, and other refractory minerals melted before it, like wax. By examining the arc with dark red or green glasses, it was found to be formed of a stream of highly incandescent particles of solid, liquid, or gaseous carbon, or perhaps all three, which rush from one charcoal point to another as long as the current is kept up to its full strength. The same thing happens if the points are of metal; in fact, whenever the feeblest spark is taken from an electric machine by, let us say, a human knuckle, infinitesimal portions of the metal composing the brass knob, and of the skin of the finger, are detached and heated to incandescence by the electric current, the air contributing its quota by supplying oxygen for the other materials to burn in; in fact, all luminous electrical effects are due to incandescent matter, either stationary, as in the incandescent light, or movable, as in the arc light, in which the current carries a glowing stream of particles from one carbon to the other.

The next step in advance was an improvement in the form of the battery itself. Referring to fig. 1, it will at once occur to the most unscientific reader that all the electricity generated on the off-surface of the zinc plate is lost, there being no copper plate to collect it. At the suggestion of Dr. Wollaston, the copper plate was bent into the shape of a U, the zinc plate being suspended in the middle, a device that considerably increased the power of the battery.

The great defect, however, of all batteries made up to the year 1836 was their lack of lasting power; that is to say, their first effects were of a most powerful character, but they gradually decreased, until they dwindled down to nothing at all. This gradual decay of strength was due to several causes. Every one knows nowadays that water is composed of two gases, oxygen and hydrogen, which are split asunder by an electric current. In the copper, zinc, and dilute sulphuric acid arrangement the sulphuric acid is left intact, but the water is split up into oxygen and hydrogen. The oxygen given off by the zinc plate is immediately absorbed by that oxygen-loving metal, and forms oxide of zinc, which is familiar to every one as Hubbuck's zinc white. This is at once laid hold of by the sulphuric acid and transformed into sulphate of zinc, or white vitrol, as it is generally called. The hydrogen given off by the copper having no liking at all for that metal refuses to unite with it as the oxygen did with the zinc. Some of the bubbles of hydrogen rise through the dilute sulphuric acid, while others stick to their birthplace, and cling to the copper surface with the greatest pertinacity, covering it over with a layer of tiny bubbles of hydrogen, which at last form an armour-plating that is effectually impenetrable to the electricity sent over by the zinc-plate. Several methods of getting rid of the layer of hydrogen bubbles were tried, such as blowing air through the liquid, but they all failed. Then, again, the liquid at last became saturated with sulphate of zinc, the whole of the sulphuric acid being used up, the only remedy being to recharge the whole of the cells. At last, somewhere about 1836, Professor Daniell, of King's College, London, conceived the idea of absorbing the hydrogen formed on the surface of the collecting-plate, and invented his justly-called "constant battery." A single cell of this battery consists of a cylindrical copper can (C C, figure 3), which forms the collecting-plate of the pair. In the middle of this stands a cylindrical pot of porous earthenware containing a zinc rod, Z. The porous pot contains dilute sulphuric acid, and the copper can a solution of sulphate of copper, or bluestone, as it is generally called. Now sulphate of copper is composed of sulphur, oxygen, and metallic copper in a state of chemical combination, and the liberated hydrogen, having a greater liking for the two first substances than the copper, it ousts the metal from its place and enters into union with the oxygen and sulphur to form sulphuric acid. The copper, thus being free to go where it likes, deposits itself on the inside of the copper can, in thin layers, which, like the metal beneath, absorb the electricity produced by the zinc rod. The two liquids, inside and outside, although they come together, mix but very slowly, passing through the porous boundary as water passes through a wine-cooler, thus forming a conducting medium, through which the electricity generated by the zinc passes to the circular wall of the copper can.

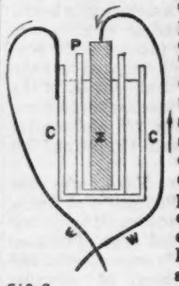


FIG 3

A cell of this kind would soon wear itself out. The whole of the copper would deposit itself on the surface of the copper can, and we should have nothing left inside and outside but dilute sulphuric acid and sulphate of zinc, in fact, we should have an old-fashioned zinc, copper, and dilute sulphuric acid pair once more. The life of the battery is therefore prolonged by suspending a little bag or cage of bluestone crystals just inside the copper can. At last, however, the copper solution creeps through the porous wall and the metal becomes deposited on the zinc, putting a stop to all further electrical action.

Daniell's battery has received numerous improvements, especially for telegraphic purposes, but with these we have nothing to do. A French electrician, Dr. Reynier, has substituted a closely-fitting parchment paper bag, strengthened by an outer covering of cotton cloth. The copper vessel is flat and a zinc plate is substituted for a rod. With fifty cells of this battery Dr. Reynier has been able by means of one of Faure's accumulators to light his house by incandescent lamps. That is to say, by using the battery for, say, eighteen hours he has been able to light his private house for six or seven hours daily. There is but little doubt that some such arrangement as the above will have to be used for electrically lighting private houses in isolated situations, where steam power is objectionable or unavailable.

Numerous modifications of Daniell's battery have been used for domestic purposes, but the only one which need detain us is Leclanché's, which consists of a plate of carbon as collector in lieu of the copper can, surrounded by a cylinder of powdered black oxide of manganese and coke consolidated by hydraulic pressure, side by side with a zinc rod. In this case the cylinder forms the porous material, and the black oxide of manganese yields up oxygen to the hydrogen developed on the surface of the carbon plate, forming with it water, which, of course, mixes with a solution of common salt or sal-ammoniac which surrounds the whole. In this case only one solution is used. The Leclanché cell is a most convenient one for domestic use, and is now nearly always employed for electric bells. It lasts for six months or more, according to the work it has to do, and is easily renewed by the most unscientific persons.

Other modifications of the Daniell battery, such as Grove's and Bunsen's, we have nothing to do with, seeing that as they emit fumes they are useless for domestic purposes.

So far the production of current electricity by chemical action; in our next we will endeavour to describe the way in which the same kind of electricity is produced by motion alone.

AMERICAN ART AT THE PARIS *SALON*.

IT is, perhaps, unfortunate for the American artists that this year's *Salon* should be regarded by competent authorities as inferior to former exhibitions, because the American painters for the first time in their history are dignified in Paris by a recognition of their artistic powers, a recognition that reaches them much earlier than the most sanguine can have dreamed of. The historian Sismondi's slander, that America is a country deficient in certain honourable attributes, amongst which he included art, certainly no longer can attach to the Americans, and reflection shows us that their history is so intimately connected with that of Europe, so entirely a sequence of our past, that Sismondi's contemptuous accusation that the Americans are a people without a history is even further from the truth than the statement that they are without art; but it has not been until the present year that their painters have shown themselves with anything like prominence at the Paris *Salon*. American art has been represented, and honourably, at the Parisian exhibitions of late years, but it has never before so distinctly "stood out" in a manner not only evident to the indulgent and interested eyes of countrymen, kinsmen, and well-wishers, but to those even of critical foreigners. It would be unkind, perhaps, to throw out the suggestion that perhaps on inquiring closely for the reason of the prominence of the Americans, it would be found that skilful methods had been adopted, in connexion with the means of becoming popular, not altogether the result of the exclusive study of the fine arts. Paris, as a teacher, is looked to by America more than ever; the *ateliers* of the French painters in vogue are crowded by young Americans to an extent that has led them to be somewhat irreverently, if suggestively, nicknamed by their foreign brother pupils in the École des Beaux Arts "*trichines*." Each year brings over its further contingent to swell a rapidly-growing colony, which has its branches in Munich, in Florence, and where not, wherever the best masters' *ateliers* are to be found. When we hear that the population of America, of the United States that is, before eight years are out will have increased by hard upon 20,000,000, and will equal the combined inhabitants of France and England; when we know the steps being taken by our cousins to foster their art education, the acknowledged success of the American painters in this year's *Salon* affords, it will be admitted, ample matter for thought.

America in the past has had more than one fine painter; in the best ages of art Italy would have been proud of Washington Allston, and Copley would have done honour to any country as he did honour both to America and to England; and since the days when those two great artists lived, there have been many American artists whose works have enriched the world. Storey, the sculptor, still lives, and is one of the most highly-respected artists in existence, and if it were not that we should have to enumerate names known alone to a few warm lovers, we could mention many American artists who deserve all the credit, if not all the honour, that is due to the pursuit of art. It seems, however, that the Americans desire in the first place a recognition of their merits from the Parisians; it is at Paris more even than in Italy or Germany that they seek the knowledge and the practice that lead to fame and fortune. London appears only to attract a few American minds who, in our narrower field, are contented with the substantial rewards for the sacrifice of the advantages of their nationality.

That the Paris *Salon* this year should contain over 100 pictures by American artists is not so remarkable as that a considerable number of places of honour should be occupied by their works; three or four of these have attracted,

and are still attracting, considerable notice. It is not only from the American colony, but from the French world of art and the press, that Mr. Sargent's Spanish dancing-girl is commanding an amount of admiration that is most worthily deserved. The work, an inspiration during a recent visit to the Peninsula, possesses, indeed, very much the appearance of an exceedingly hasty, but not altogether ill-considered, work by Velasquez. That it has made a fame for the painter there can be no doubt, and this picture,—hanging so near another of his works, a portrait of a young lady in black, a picture which leaves very little room for severe criticism,—seems to have placed Sargent not only just now at the head of the American school, but to have placed him on equal ground with the most prominent French painters, a brilliant rival of his successful master, Carolus Duran, a position which, however, he will find extremely difficult to hold, when we consider his youth and comparative inexperience. Should Mr. Sargent, however, replace Mr. Healy, so long known to the American colony of Paris,—but who is literally conspicuous by his absence in this year's *Salon*,—the homes of America will have added to them during the next generation many a charming head that will be handed down to posterity. It is with some pleasure that we notice this young painter's success, as we may fairly claim to have been among the first, some years ago, to draw attention in these columns to the merit of M. Carolus Duran's clever pupil.

If Mr. Sargent's portrait has received almost the unanimous suffrage of a critical art public, Mr. Whistler's portrait of a lady in black fails to please the Parisians. Its merits, whatever they may be, place this American picture, in the estimation of not a few, in the light of an American caricature; it has, at least, the quality of caricature, in that it promotes mirth.

Bridgman, the American painter, who is not unknown in England as a delineator of Egyptian subjects, in the manner of his great master, M. Gerôme, has this year deserted his patient archæological inquiries, and has painted a full-length figure of a handsome Roumanian blonde, dressed in the elaborate and brilliant costume of her country; coloured somewhat in the manner of the German painter, Richter. This picture occupies a place of honour in one of the chief rooms, and is as unlike the uneducated ideal of an American creation as it is possible to conceive. Bridgman's second picture, painted again in a different manner, reminds one of Decamps and Millet, but in the treatment of the subject, "Colza-Planting in Normandy," he is perfectly original and independent. The work fairly ranks, in our opinion, among the few fine landscapes of this year's *Salon*.

One is not prepared to meet in a French exhibition with so ambitious and thoroughly classical a subject as that of "Alexander at Persepolis," signed by an American; Mr. Hinckley's effort, displayed on a huge canvas in thoroughly foreign style, merits at least the recognition that should await any attempt to work outside the usual run of easel pictures. Hung over one of the doors, Mr. Hinckley's work fully asserts itself; the treatment is French, in the Couture style, though the same can scarcely be said of the colouring or of the unusual amount of energy and movement displayed in the figures. Mr. Hinckley is another promising pupil of M. Carolus Duran's *atelier*; but let him avoid trying to astonish the public.

Miss Elizabeth Gardner, so faithful a pupil of M. Bouguereau that it would really require the utmost skill to decide between the work of the master and the *élève*, has no more than justice done to her charming "Daphnis and Chloe" by its position on the line, where her delicately-painted figures form as curious a contrast to Mr. Sargent's "dash" as it would be possible to conceive. Mr. Ridgway Knight's pathetic picture of a sorrowing mother surrounded by sympathetic friends at the doorstep of an old French cottage, shows us the romantic side of the American artistic nature, combined with the realistic study which the modern ideas demand. Mr. Simons, in his amusing "Rendezvous de Chasse," shows himself a faithful pupil of his master, Vibert; and should he continue to follow this style we may confidently predict him ample recognition in his native country, where Vibert's clever "skits" on monkish life and Spanish intrigue have always been favourites. Mr. L. B. Harrison's landscape of "November" holds well its position on the line; the pretty grey tone of the picture, the red leaves and the greenish stumps, with the young peasant girl in the foreground, are full of the romance which every one must have felt in the country when the leaves have all fallen from the trees, and before the snow has buried everything up in its folds of blinding monotony. Mr. Harrison's other exhibit,—a young girl dressed in white returning home through the fields from her confirmation,—shows in its charming colour a careful study of nature. Mr. Boggs (a great New York family name), in his representation of the Place de la Bastille, with the Column of July, on a wet day, has evidently been inspired by a recent success of M. Luigi Loir, but his picture not undeservedly attracts attention in the honourable position it occupies.

As for Miss Dodson's ambitious Scriptural subject,—of colossal dimensions,—representing Moses, supported by Aaron and Hur, praying for the defeat of Amalek, it is to be hoped that the work is only a commission, though there is strong evidence of study. Miss Dodson will, we trust, attempt next year something more in unison with the spirit of our times.

Mr. Chase's portrait of Peter Cooper has deservedly received its position on the line, and in a centre, not alone on account of the honour that is due to the noble benefactor it represents, but on the score of its independent merit as a striking portrait; as a sitter, however, the worthy model was inspiring, reminding us not a little of the late lamented Sir Henry Cole. Mr. Chase's neighbour, Mr. Beckwith, had better beware of a too great swiftness in his portraits, a quality alone to be obtained at the price of long and hardy study. Mr. Curtis's "Flirtation" is well painted, and the story well told, but thoroughly French,—a feature only too observable in all the American art at the *Salon*. Mr. Simmons must, we suppose, be excused if his "Study at Concarneau" reminds us of Breton. It was the home of that romantic painter of peasants and evening effects, and this picture was doubtless the result of a pilgrimage to a beloved shrine; but the merit of the work has justly given it a place on the line. Miss Singer's charming "Marie," who in her Breton cottage spins by the fire with her baby, which she lulls to sleep with a song, is just such a subject as the refined mind of a woman knows how to treat so well. Mr. Mosler, in his "Betrothal," has contributed this year a picture of no less merit than that which not long since was purchased by the French Government to represent in the Luxembourg Gallery the modern American school.

Among the many other American works exhibited,—mention of all of which we must be excused from making,—it would be unjust to pass over the works of the American wood-engravers, as represented in the black-and-white room by Mr. Closson's frame of proof-impressions of prints, most of which have become familiar to the English public in the pages of the two illustrated American magazines now established among our periodicals. In the midst of many other excellent woodcuts, etchings, engravings, and lithographs, these delicate works essentially "tell out" to do honour to the American school of wood-engraving. But, returning to the pictures, it would be equally unjust to pass over the familiar name of Albert Bierstadt, represented in this year's *Salon* by a picture of American stags. Mr. Bierstadt represents the old-fashioned school, and though he has long been *hors concours*,—inadmissible, that is, to compete for the medal,—it would be rather in the tone of disrespect that his younger countrymen would be found speaking of him, if asked to give their opinion on the once-famous painter of the "Niagara Falls."

A comparatively new name to us among the American painters, A. T. Harrison, placed honourably in the *Salon*, is represented by a picture entitled "Châteaux en Espagne," and never do we remember having seen so favourite a subject so thoughtfully treated. The happy little sand-boy lying on the sea-shore, his blue eyes day-dreaming into space, the connexion of his thoughts with the sand-built castle at his side surmounted by a delicately-painted bird's feather, the danger of the propinquity of the great sea so soon to wash away the shell-defended castle, all are admirably rendered. The picture possesses not only the merit of suggestive thought, but of an agreeably free execution and colouring according to the latest methods of open-air study. Mr. Harrison's little sand-boy is not the only builder of *châteaux en Espagne*; the American painters are all just now building magnificent castles in the air, as their brother-architects are building at home substantial palaces, veritable castles, that the occupants are employing the painters to decorate.

It may be safely said that the American painters have before them a good time; to them at least is the possession of the reality of youth, and the hope and the promise of years well occupied, and the happiness and profit that follow correctly-aimed effort. Americans, from nearly all quarters of their big country, are overcrowding the schools of art that exist in Paris, in Munich, in Florence, and elsewhere, and American painters are beginning the difficult and fascinating art with peculiar advantages,—advantages derived from the teaching of masters who themselves have learnt much by their own failures and by the experience of the failure of others,—men who, after years of labour in search of a high ideal, have reached a period when realistic art is the most honoured. American painters have the advantage of beginning to practise art at a period when its hopes are not confined to ideal comforts, but when something more than an assurance seems to exist that devotion to art does not bring with it the promise of hope alone, but those more easily-understood enjoyments that are at the command of the possessors of wealth.

WORKS BY M. J. J. TISSOT.

FOLLOWING an example which has been rather often set of late, M. Tissot has opened an exhibition of his own works in the Dudley Gallery. M. Tissot has a distinct claim to be regarded as an artist with a special stand-point. He has devoted himself mainly to the painting of the figures and manners of every-day people in every-day society; and he has chosen to take for his field of operations that section of society which has its head-quarters in London. In realising on canvas the manner and style of English people of a certain social type, dressy young women and young men, who represent the superficial polish of society, without any higher qualities, M. Tissot has succeeded in a way in which no other French painter that we can think of has succeeded. The want of comprehension of the English lady, both by French novelists and French artists, is almost proverbial; but M. Tissot shows us, as far as he goes, as we really are. The two young ladies, in faultless costumes, who lounge and flirt on the stern-gallery of "H.M.S. *Calcutta*" are absolutely photographs of the London *belle*, in summer array. The fashion of dress has changed since it was painted, but it is absolutely truthful to what was in fashion a few years ago. "The Thames," showing two or three figures on the deck (we regret to say) of a steam launch, is an equally truthful representation of a somewhat quieter and less fast set of personages. What we regret is that latterly the artist seems to have confined his attention to the most foolish and inane type of *belle*, the young lady who has no claim upon our interest but being well dressed and well mannered, and whose countenance expresses only good-natured *ennui* and absence of ideas. When M. Tissot first came among us he did better than this; he painted one or two large and elaborate "Society" pictures, which were exhibited at the Royal Academy, in which he showed the more refined elements of London Society, in their external appearance at least, with the greatest truthfulness. He has since then painted many figures which only represent, if one may use such a contradictory expression, a rather vulgar kind of refinement, and some of the etchings in this collection come under that category. Among the paintings, of which about a dozen are included in the present collection, there are, however, a set which show the application of art to the illustration of modern life in a rather more serious fashion; a group of four pictures illustrating "The Prodigal Son, in Modern Life." The treatment of the subject is not very elevated, but there is a great deal that is very clever in the four pictures. "The Departure" shows the interior of an old-fashioned bay-windowed room overlooking the river at Greenwich, the intending prodigal sitting on the table and undergoing the arguments of his grey-headed father, a prepossessing old gentleman, in whose face and manner there is a good deal of feeling expressed. The elder brother looks out of the window with an air of indifference, and a younger sister looks rather anxiously up from her work. The second picture, which is very unsatisfactory as a composition, shows the prodigal looking on at the performances of some

dancers whose nationality we cannot make out, and apparently with a frail female companion under his protection. The composition is confused, and does not tell any story very clearly. In the third the prodigal has landed barefooted and in rags from a cattle steamer, and embraces the grey-headed father on his knees: the sister behind puts up her gloved hands to each side of her face with a very natural action of consternation. In the last picture we have "the fatted calf" served up on a dinner-table under an arbour by the Thames, the prodigal sharpening the carving-knife, the sister sitting by him with her eyes brimful of mirth, and the mother on one side (a very nice elderly lady's face), while the father turns round to welcome a boatful of flannelled young men, one of whom is just landing, while the elder brother on the other side whispers an explanation behind his hand, "I say, Jack's turned up again, and the old governor's making no end of a fuss over him." The boat-load of men, who are seen below the bank, the spectator looking down upon them, are very well drawn and painted; the whole thing is very clever and worth looking at.

Besides his pictures and etchings, M. Tissot exhibits some specimens of work in bronze and *cloisonné* enamel, designed, modelled, and executed by his own hand. The principal specimen is a design representing Fortune seated upon the globe, which in turn is carried by a tortoise, the emblem of "Patience, the principle of all success." The group stands about 3 ft. high, and is an effective fancy as a whole, besides exhibiting some very good ornamental detail in parts; but we hope the artist will not carry out the idea of "adapting this work for a life-size monument or fountain": as a small design it may pass well enough, on a large scale it would be in danger of appearing very absurd. The exhibition also contains some tea-pots, vases, and other articles, decorated in *cloisonné* enamel by the artist's own hands. These are in very good taste, and there is considerable originality and effectiveness in M. Tissot's detail. He has had great difficulty in discovering the flux and tints for this work, which are kept a trade secret; but he seems to have succeeded in the end in producing very good results, and it is interesting to see the original work of an artist in this medium, instead of the mere panelling of Japanese work, which is what we usually see.

RECENT PROGRESS IN THE ELECTRIC LIGHTING OF BUILDINGS.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the meeting of this Institute on Monday evening last, Mr. Horace Jones, President-elect, in the chair,

Mr. John Slater, B.A., Fellow, read an interesting paper on recent progress in the electric lighting of buildings. He commenced by observing that in the spring of 1879 a committee of the House of Commons investigated the subject of electric lighting, and examined a large number of witnesses. Although the time that had elapsed since that committee sat was so short, it was now extremely interesting and even amusing to refer to the evidence given at that time. Mr. Conrad W. Cook then expressed the opinion that in small and narrow streets, and in small shops, electric lighting could not be applied at all. The Borough Engineer of Liverpool said that it might be applied to street lighting, but not economically. Professor Tyndall did not think that an electric current generated by a dynamo-machine, and capable of producing one light of 10,000-candle-power, could be split up so as to produce ten lights of 1,000 candle-power each. These and other opinions expressed on the same occasion no doubt carried very great weight at the time, but, fortunately for the world, the opinions of scientific men, however eminent, did not damp the ardour of investigators, although they illustrated the danger of prophesying without knowledge. The Paris Electrical Exhibition of last year, and the one shortly to close at the Crystal Palace, contained many practical illustrations of the possibility of the almost indefinite subdivision of the electric light. At the present time there was an almost unanimous consensus of opinion amongst electricians that it is hopeless to expect that electricity could have full scope as a means of illumination until the legislative restrictions to its use for domestic purposes were removed. The cause of this revolution in opinion was to be found in the invention of incandescent lighting, which was undoubtedly the form which would be mostly used for domestic purposes. This incandescent lighting, of which the rush to the front had formed the chief feature of the past year's progress, might be defined to be the unlimited power of concentrating large quantities of heat into small foci without consuming the heated body, which thus became a stable and unchanging point of light, in contradistinction to the arc lights, in which the glowing material was continually disintegrating or burning away. The incandescent systems of electric lighting were based on the fact that, if preserved from combustion, carbon is practically infusible, and the chief difficulties in the way of making incandescent lamps lay in the fact that it was necessary to inclose in an exhausted glass globe an extremely thin filament of carbon, which must be in electrical contact with wires outside the globe, and which must be able to stand an enormously high temperature. Messrs. Swan, Lane-Fox, Edison, and Maxim, had overcome these difficulties in different ways. When a current of electricity was sent through any circuit, heat was generated, the amount of heat depending upon the resistance to the flow of the current offered by the substance forming the circuit, and the amount of light depending upon that resistance. The amount of that resistance, and therefore the quantity of light emitted, depended upon the nature of the material employed. By sending an electric current through platinum wire, the latter would immediately begin to glow with a dull red heat, and if platinum wire could be brought up to a very high pitch of incandescence, so as to become an effective means of lighting, it would form the simplest material for incandescent lighting. But, to secure sufficient illuminating power, it was found necessary to employ carbon in some form, and, in order to prevent the destruction of the incandescent carbon by combustion, which would be very rapid if the oxygen of the atmosphere came in contact with it, it was necessary that all the incandescent carbon lights should be secured in a vacuum, or at any rate in an atmosphere from which oxygen was excluded. One of the greatest advantages of the incandescent systems of lighting was that they could be used with either alternate or continuous currents, and in connexion with almost all dynamo-machines. They could also be conveniently connected with portable storage batteries, about the possibility of which there was only a whisper a year or so ago. The invention of storage batteries would mark an epoch in the history of electric lighting. Faraday's wonderful genius went far towards the elucidation of the problem. Having mentioned the Planté and De Meritens storage batteries, the author passed on to notice the Faure battery or accumulator, which consists of lead plates or strips thickly covered with red lead or minium, and folded up with felt between them, the whole being placed in a box of acidulated water. These batteries could be charged with electricity, and would give it out again gradually: hence their value as portable reservoirs of light. The Faure battery, however, possessed the drawback that the minium or red lead with which the lead plates were covered was very liable to be partially displaced during the transit of the battery from place to place. In the latest invented and patented storage battery, that of Sellon & Volckmar (twenty-eight cells of which were being used for lighting the Institute room on the present occasion), the coating of minium and the interposed layer of felt between the lead plates were dispensed with, the battery merely consisting of a series of lead plates in which perforations had been made, such perforations being filled up with a certain substance which formed the effective part of the plates. Every one admitted that the electric light was much less vitiating to the air of rooms, and where the incandescent system of lighting was adopted, not a single particle of oxygen could be absorbed by the lights. But could electric lighting be used as economically as gas? The answer to the question depended upon the mode of distribution adopted. As a matter of fact, a pound of coal turned into electricity through the medium of a steam-engine and dynamo-machine was capable of giving three times as much light as when turned into gas. The economic value of incandescent lighting was one of the most important points to be considered, and although at present the data upon which to found an opinion were but scanty, the cases in which the details of cost had been most accurately worked out tended to show that the economic value of the new means of illumination had been, if anything, under-rated. The average life of an incandescent lamp, up to the present time, had not been more than 1,000 hours, but improvements in the manufacture tending in the direction of greater durability might be hoped for. Sir William Thomson, who had had his house completely lighted by electricity, stated that lighting by electricity was no more expensive than lighting by gas,—leaving out of account, of course, the first cost of the lamps, which would, there was little doubt, be improved and cheapened by competition. Messrs. Furlong & Sons, of Cork, who had used electric lighting in their factory, stated that it showed an economy of 50 per cent. as compared with gas. A very interesting installation of electric lighting had been made at Godalming, the Swan incandescent lamps being used for the lighting of shops and houses, and the Siemens arc lamps for the streets. The tradesmen who had used the electric light in their shops stated that although they were charged a little more for the electric light than for gas, the extra cost was far more than compensated for by the total absence of injury to their goods. The readiness with which the incandescent lights lent themselves to any scheme of decoration was one of their chief attractions. There was no necessity for following on the lines of gas-fittings, as the conditions were so completely altered; but points of light could be placed wherever they were required, and there was no fear of blackening ceilings and decorations, or of setting fire to the most easily-ignited materials. The progress of this system of lighting had been so rapid that architects had as yet had no time to turn their attention to its decorative capabilities; but when they did so, they would find it fulfil every requirement for perfect lighting. Having noticed some of the exhibits in the Paris and Crystal Palace Exhibitions, the lecturer alluded to the arc-light systems, in which, he said, much less progress had been made during the past year than in other departments of the electric lighting problem. Nevertheless, the sphere of usefulness of these systems had become more clearly defined, and at the Mansion House was to be seen a good example of their adaptation to rooms of an exceptionally large size. If these large lights could be concealed, and their rays reflected downwards from a large screen or a white ceiling, a very pleasant and diffused light would be obtained, and the slight irregularities, due for the most part to the carbons, would be much less perceptible. Simplicity of construction was the great thing to be aimed at in these lamps, and the Weston arc lamp was a good example of their newest form, and this might be termed a strictly electrical lamp, as contrasted with a mechanical one. The great difficulty with which these arc lamps had to contend was in the nature of the carbons, in the manufacture of which but little improvement had taken place. Probably the manufacturers had had so much work thrown on their hands by the rapid development of the already large industry of electric lighting that they had had no opportunities of making careful experiments with the view of securing homogeneity in the carbons,—a quality which was necessary in the highest degree in order to secure steadiness of light. The lecturer next passed in review the social aspects of the question of electric lighting. These concerned the distribution and measurement of the electricity, the conditions necessary for reconciling the rights of the consumer and of the purveyor, and the risks to be guarded against. Several systems of measuring electricity had been devised, notably that invented by Mr. Edison, but in the author's opinion it would probably be found more convenient, when the electric light was largely adopted, to dispense with measuring it, and to make a fixed charge per annum, based on the size and requirements of each house, for the electricity supplied, somewhat in the same way as the water companies charged for water. With regard to legislation on the subject of electric lighting, he thought the Bill brought in by the Board of Trade, and which was now before Parliament, would be productive of good results. Fears had been expressed lest the various electric lighting companies should ever develope into such gigantic monopolies as the gas companies. He did not think there was any ground for alarm. The conditions of distribution of gas and electricity were different; for, whereas the gas companies were able to extend their mains, mile after mile, to almost any distance, an area of one square mile would pro-

bably be found to be the limit of profitable distribution from each centre or installation. For electricity to compete with gas as a general means of illumination, it must offer as many facilities as its rival; and the Edison installation in Holborn, and that of the Swan lamps at the Savoy Theatre, showed practically that this condition was complied with. After briefly describing these installations, the lecturer observed that other and more extensive installations of the electric light would presently be seen, including that at the new Royal Courts of Justice, where, he believed, Swan lamps were to be used, the electrical arrangements being in the hands of Messrs. Crompton. He then proceeded to explain the various methods of laying the mains, connecting the branches, and arranging the lamps so that all were perfectly independent of each other, and showed how the strength of the current in the mains could be regulated in proportion to the amount of work it had to do. Perfect insulation throughout was the great desideratum, and if this point were always carefully kept in view, the dangers of electric lighting would be reduced to a minimum. "Insulate! Insulate! Insulate!" should be the motto of all who employed electric lighting. On the subject of wires conveying the currents for electric illumination, Mr. Slater expressed the strongest opinion that overhead wires should not be allowed, for they were not only dangerous, but unsightly. A great deal had been made of the dangers attaching to the use of electricity as a mode of lighting, and these cries of alarm were no doubt largely attributable to the gas interest; but he should like to see Gas, as plaintiff, come into court against Electricity, the defendant, with clean hands. If all the accidents that had occurred from the careless use of gas (from the blowing out of a house-front to the Tottenham Court-road disaster of two or three years ago) were to be recorded, what a formidable indictment could be made out against Gas! In America, considerable attention had been given to the precautions to be taken in the use of the electric light in buildings, and the Board of Fire Underwriters of New York had framed a code of regulations bearing on the subject. The Crystal Palace Exhibition was an exceptional case, as the installations were temporary, and the risks there were such as could not possibly occur in a well-devised permanent arrangement. Mr. Slater then referred to the importance of the subject to architects, and concluded his paper thus:—The progress of electrical science is the most striking feature of the latter part of the nineteenth century, and the day is not far distant when we shall find a certain acquaintance with the subject a necessity for us architects in our every-day work, unless we wish to be entirely in the hands of the men whom we employ. I would respectfully suggest to the Council the desirability of requiring a certain amount of knowledge of physical science from the candidates in the Obligatory Examination that has recently been set on foot, and the results of which are already so promising. Science has captured the lightning, it is true, but it is scarcely tamed yet; let us beware that we do not attempt to deal with this new servant ignorantly. Electricity is a new power given into our hands, and it behoves us to study its advantages, and to guard against its dangers, and to learn to use it, together with the older means at our disposal, in accordance with the motto of the Institute, "Usui civium, decori urbium."

In the discussion which ensued,

Mr. Swan said he had rarely, if ever, had the opportunity of listening to a more lucid exposition of the subject of electric lighting than that which they had all had the pleasure of hearing from Mr. Slater. He could fully confirm the statement made by the lecturer as to the essential economy of electric lighting, and more especially so with regard to electric lighting by incandescence,—the system of lighting which, he thought, had the widest application, and therefore possessed the greatest interest for the public. Gas was the light with which electricity would have to compete. Now 2 cwt. of coal carbonised in a gas-retort would produce 1,000 cubic feet of gas, and that would give about 3,000 candle-light power for one hour if burnt under ordinary conditions, *i.e.*, by burners consuming about 5 ft. of gas per hour, and giving a light of about sixteen candles. If, however, the same quantity of coal were employed to generate motive power through the medium of an economical and effective steam-engine, 100-horse power for one hour would be obtained, and by means of a good dynamo, each horse-power could be converted into electric light of at least 200-candle power, so that the 100-horse power obtained from the coal would be capable of producing 20,000-candle power through the medium of the electric light as against 3,000-candle power obtained by the gas resulting from the carbonisation of the coal; and even allowing a handsome margin for the loss of the residual products of gas manufacture, the gain was very largely in favour of the electric light. But such economy as he was speaking of could only be obtained under the best conditions as to installation, well-ordered generating stations, and proper means of distribution, and the obtainment of such conditions would, he trusted, be greatly facilitated by the legislation now pending. In order to properly test the capabilities of the electric light on a commercial scale, it was of the utmost importance that due facilities and securities should be given for the investment of capital in the creation of large electric lighting stations. He was very glad indeed to find that architects were taking an active interest in the question, for they would naturally have to be intimately concerned in carrying out the impending and very desirable change in our method of domestic illumination. Speaking as an electrician, he was quite content to leave the decorative arrangement and disposition of the lights to architects, for electricians had their hands sufficiently full in dealing with the physical aspects of the subject.

Mr. Lane-Fox said that reference had been made to the supposed dangers of electric lighting, but with ordinary care and intelligence such dangers did not exist, however much the self-interest of people interested in gas-shares might lead them, perhaps unconsciously, to conjure them up. It was true that some few unpleasant results had occurred,—that one or two people had unfortunately been killed, and that some fires had occurred; but those disasters had been the result of carelessness or ignorance. Had not disasters resulted from the use of gas, especially at first, from explosions due to leakages in the pipes,—a defect somewhat corresponding to imperfect insulation of electric wires? He believed that in the early days of gas-lighting the companies lost through leakage 50 per cent. of the gas manufactured; after a time they reduced it to 30 per cent., and now, he believed, the loss by leakage was not more than 3 per cent. When gas was introduced there had been no previous experience in making the joints of the pipes gas-tight; but in the case of electric lighting, much previous experience in the insulation of wires had been obtained, owing to the practice of telegraphy. It was a mistake to suppose that an electric current of such high tension as to kill a man who should make his own body a part of the circuit was a current such as would be ordinarily employed in electric lighting, for the lower the tension of the current, the more easily would the wires be insulated, and the more easily could the current be divided. Of course, in a large and new industry such as the progress of electric lighting had given rise to, there were many people thrown into it at first who had had little experience, and, occasionally, the consequence of this might be seen in defective and improper workmanship, but these matters would speedily right themselves.

The Chairman, in inviting further discussion, said that he should not be inclined to give a verdict to Mr. Swan on the score of economy without hearing the gas companies on the other side. From inquiries which he had made, he had learned that there was economy in using the electric light if the area to be lighted was large, and that the arc-light systems were, broadly speaking, four times as economical, lighting power for lighting power, as the incandescent systems. We were told of the futility of attempting to gild refined gold, to paint the lily, or to perfume the violet, but Mr. Slater had certainly illumined the subject of electric lighting.

Mr. A. W. Blomfield, in proposing a vote of thanks to Mr. Slater, said he thought the hint thrown out in the paper, as to the necessity of young architects giving some attention to physical science, was of very great value. If, as there could be little doubt, electricity was to be the light of the future, architects would certainly find it necessary to make themselves acquainted with the laws which governed its use for such purposes.

Mr. C. F. Hayward, in seconding the motion, spoke of the Godalming installation of electric lighting, which, on the whole, had been a great success, although there had been a breakdown owing to the erratic conduct of the river Wey. Messrs. Siemens being called in, they superseded the water-power by a steam-engine, since which time the light had been uninterruptedly good. Had there been in existence at the time the change was effected such an appliance as either of the storage batteries which had been referred to, there would have been no need of making the change. As a resident in the neighbourhood of Godalming, he had had ample opportunity of witnessing the success of the experiment, and should have no hesitation in lighting his own house by electricity if he could induce the authorities to extend the wires so far.

The motion having been carried, Mr. Slater briefly replied, and a vote of thanks was given to Messrs. Sellon & Volckmar for the use of the storage batteries and for the assistance which they had rendered Mr. Slater in fixing the wires so as to enable the dome and ceiling of the Institute meeting-room to be very effectively and steadily illuminated by incandescent lamps.

The room was probably never so crowded as it was on this occasion.

A CAUTION TO CONTRACTORS.

REPUDIATION BY A CORPORATION OF A CONTRACT NOT UNDER SEAL.

WHEN the case of Hunt *v.* The Wimbledon Local Board (Law Reports 4, Common Pleas Division, p. 48; and Roscoe's Digest of Building Cases, p. 31) was decided, in which a contractor failed to obtain payment of his account because the contract between himself and the Board was not under seal, we expressed a hope that contractors would be warned by it against omitting the proper technical details in making contracts with corporations or local authorities. In the note to the case in Roscoe's "Digest," the necessity for caution which the decision renders necessary in dealing with public bodies is also pointed out. It cannot be said, therefore, that builders and contractors have not had fair warning to be careful how they deal with corporations. We regret to say that another instance of the necessity of this care is to be found in the recently-decided case of Young & Co. *v.* The Mayor and Corporation of Leamington (51 *Law Journal* Reports, Q.B.D. (App.), p. 292). We regret it because a firm which has done work for which it expected to be paid has been kept out of its money by the employers taking advantage of a slip in regard to a legal technicality. It is true that the Court of Appeal has held that the Corporation of Leamington was acting on its strict legal rights, but that does not make the nonpayment of Messrs. Young & Co. any the less a reprehensible transaction. For if work has been done, and the person for whom it was executed has got the benefit of it, and then refuses to pay for it, this is an act of which every member of a corporation should be ashamed, and of which each member as a private individual would, we are sure, not be guilty, even if he could. These expressions are, our readers will see, fully justified by the report of this case which now lies before us, and which we desire to call attention to, so that, if possible, it may be the last of these scandalous defences.

In November, 1876, one Powis, by contract under seal, agreed with the Corporation of Leamington, who were the Urban Sanitary Authority under the Public Health Act, 1875, to execute certain works for supplying the town of Leamington with water. In 1878 a person named Jerram was appointed surveyor to the Corporation under its official seal. The new surveyor found that Powis was not proceeding satisfactorily with the work, and ultimately Jerram took the work out of his hands, and was ordered by the Corporation to get the work completed in the best possible manner. On the invitation of the surveyor, Young & Co. tendered for the completion of the work, and agreed to carry it out and complete all the necessary works. As a matter of fact, Young & Co.'s tender was never actually placed officially before the Corporation, but a memorandum of the agreement was signed by Young & Co. and Jerram. The work was then continued and was duly executed, the Corporation from time to time making payments to the contractors on Jerram's certificates. "It was found as a fact (in the special case)," we quote from the regular report, "that the additional works executed by the plaintiffs were necessary and incidental to the completion of the works left unfinished by

Powis, and also that the employment of the plaintiffs to execute the works was within the duties and authorities of Jerram as the engineer of the Corporation. The Corporation took possession and obtained the benefit of the works executed by the plaintiffs, but refused to pay a balance of 6,000*l.* odd, on the ground that the employment of the plaintiffs was not an employment under the common seal of the Corporation." Now, so far as regards the law of the case, it is extraordinary that Young & Co. could ever have hoped to overcome this defence. Section 174 of the Public Health Act distinctly states that "every contract made by an urban authority whereof the value or amount exceeds 50*l.* shall be in writing and sealed with the common seal of such authority." Such points as that the original contract with Powis being under seal, no seal was therefore necessary to that between Young & Co. and the Corporation; that Jerram being appointed under seal, therefore it was not necessary that this one should be,—were obviously but the straws at which drowning men catch. The statute is clear enough, and as the Corporation was acting, so to speak, as trustees for the public, it was equally clear it could not be made liable on the ground that it had received a benefit from the work in question. If there had been any legal ground upon which the case might have been decided in favour of the contractors, it is clear enough that the judges would have used it, for, said Lord Justice Brett, in beginning his short judgment, "I have come to the same conclusion [as the other two judges] *after many attempts to come to another*"; and Lord Justice Lindley also pointed out that, when the Legislature had passed an Act the judicial bench was bound to construe it according to its legal meaning, even though it might lead to hardships. Therefore it may fairly be said that the case should be carefully borne in mind by all contractors; for we fear that there may be some other bodies in England as mean as the Corporation of Leamington. It is perfectly obvious that, had the Corporation desired to be just, they would, if they had considered the claim was too great, have referred it to arbitration. But not only should the case be borne in mind for this warning which it conveyed, but also because of an important sentence in the judgment of Lord Justice Brett, which we will give in its entirety,—"Further, having read all the cases with regard to the doctrine of work done for and accepted by a municipal corporation, I am bound to say that I have come to the conclusion that even if this corporation were a municipal corporation, and not a board of health, the want of seal would have prevented the plaintiffs recovering in the present case." Lord Justice Lindley does not go so far; he merely states that the cases are numerous and conflicting. But for laymen, we imagine, it will be sufficient to have Lord Justice Brett's clearly-expressed opinion, and therefore the short and plain rule is, always to have a contract with a corporation sealed with the official seal. The presumption is that otherwise a corporation will, even if it does not wholly repudiate its liabilities, yet use the absence of the seal to get off as cheaply as it can. Again, too, we hope that this case will be a warning to borough surveyors and engineers. They ought to be perfectly aware of the necessity for a corporation-contract being sealed, and should never allow any contractor, however ignorant he may be of legal matters, to enter into a contract without it is sealed. They may perhaps say that they do not undertake to look after the interests of the contractor; nevertheless it is perfectly clear, knowing the risks which a contractor who does work for a corporation runs if his contract is not sealed, that they should, as honourable men, take care that the contract is made a binding one. We have more than once pointed out that architects are by no means strict enough in giving written orders for extras; we are afraid that surveyors and engineers to corporations are also not sufficiently careful in seeing that the corporation seal is affixed to contracts with the corporations of which they may be the servants. The necessity of caution in this matter is so great that we consider the several associations of master builders would do well to circulate a memorandum among their members pointing out the short and brief rule of law upon this subject.

Social.—Mr. Horace Jones, as President of the Royal Institute of British Architects, has issued invitations to a dinner at "Limmer's" on the 8th of June, "to meet the Council."

HOUSE RENT IN PARIS AND IN LONDON, AND PROPORTION OF SOULS PER HOUSE AND PER FAMILY.

A WELL-KNOWN French publicist has lately published, in a French industrial journal, some details of the rental of Paris (of which we gave an abstract at the time), which contrast rather forcibly with the experience of London. M. Paul Leroi de Beaulieu is, indeed, of opinion that the homes of the poor are being banished from Paris. The value of land in that city, he considers, is becoming so enormous, that the owners are unwilling to allow the erection of any but the more expensive kinds of houses, so that there is an increasing want of accommodation for the poorer classes. These things, however are comparative. M. de Beaulieu's view may be accurate for France; but we should be glad to have no more serious difficulties to contend with in London. Land in Paris, he tells us, rises to the price of from 50 to 60 francs, and even to that of from 80 to 100 francs, per square mètre. Land in London has been sold for equal prices per square foot. Sixty-eight per cent. of the tenancies in Paris are let at a rental not exceeding 12*l.* per annum. The total number of separate tenancies is stated at 684,992. The population is over two millions; but as the returns have been unaltered, so far as they are published in the only authorities we have at hand, for some years past, we cannot speak with the precision we should wish as to this. Roundly, however, the proportion is a little under three souls per tenancy. In London, in 1881, 3,814,571 persons occupied 486,286 houses, being at the rate of 7·84 persons per house. Over the "Greater London" of the Registrar-General (the above being what is called the "Inner London" of that officer's return) the number of houses is 645,818; the population, 4,764,312; and the proportion, 7·37 souls per house. But in some districts, as for example in St. Pancras, the proportion rises to nearly 10 persons per house. In the City it is 7·75 per house. The lodger element in London raises the proportion, while the French habit of distinguishing the *appartements* as separate tenancies prevents any very exact comparison. Still, if we allow the same proportion of occupancy to habitation all round, we find that two-thirds of the population of Paris are lodged for something like 21d. per head per week, and we apprehend that the corresponding figures, if attainable for London, would show a much more costly rate of housing.

As far as the figures cited go, the relation between the numbers and the rents of the tenures seems to be regular and inartificial. Converted into English money, they are as follows:—

Tenancies in Paris.	Number.	Percentage.
Under 12*l.* per annum...	468,641	68·
Thence to 20*l.* ,,	74,360	10·8
,, 30*l.* ,,	61,083	8·8
,, 40*l.* ,,	21,147	3·1
,, 50*l.* ,,	17,202	2·5
,, 60*l.* ,,	6,198	0·9
,, 120*l.* ,,	21,453	3·2
,, 240*l.* ,,	9,985	1·4
,, 400*l.* ,,	3,049	0·4
,, 800*l.* ,,	1,453	0·2
Above 800*l.* ,,	421	0·06

The most curious anomaly in the above figures is the small proportion of the tenancies ranging from 50*l.* to 60*l.*,—a kind of house for which there would be more than ordinary demand in England; and the unduly large proportion of those ranging from 60*l.* to 120*l.* No doubt an analyst of the social habits of the Parisians would be able to throw light on this curious irregularity (supposing the figures to be correct) in the ascending series. The small number of tenancies (little more than 2½ per cent. of the total), above 400*l.* per annum, must contrast very forcibly with London rents.

The proportion of inhabitants to houses is a measure of national prosperity which it is important to regard aright. In comparing one country with another it is necessary to bear in mind the differences of national habit, as in the case of the use of separate apartments in one large house, or of smaller independent houses. In the same country, at different periods of time, this element of disturbance is less apparent. In England and Wales, in 1801 there were 564 inhabitants to 100 houses. In 1841 the proportion had fallen to 540. In 1881 it was 537. In Ireland, in 1841 there were 617 inhabitants to every 100 houses. In 1881 there were only 565. The larger numbers in the latter island signify more than they would appear to do at the first glance, as the houses, taken all round, are of a very far inferior description. It should be noted also that the number of families returned in Ireland in 1881 was 994,579, giving an average of 519 souls to a hundred families. The difference of forty-six souls per hundred families as compared with the number of inhabited houses is serious, being nearly nine per cent. If this difference represents the number of lodgers, it is a remarkable state of things, but it is not evident what else it can represent.

THE PROPOSED INTERIOR DECORATION OF MILAN CATHEDRAL.*

IN the course of last November I received an invitation to visit Milan, and to give an opinion on the decoration of the cathedral. I must say that I was surprised, on the one hand, at the invitation, and, on the other, at the fact that the decorative restoration of the cathedral was to be taken in hand. The committee appointed to deliberate consisted of the following members:—Claudio Bernacchi, architect and professor at the Academy; Cesare Cantu, historician; Forcellini, architect and city engineer of Venice; Gerolomo Induno, painter; and myself. I must notice here something, perhaps, unknown to you, but highly interesting, and probably unique in the history of architecture. This is the fact that the Administrazio del Domo has existed from the year 1302, when it was instituted as an independent body, up to the present day. All gifts had to be handed over to this body, which had to decide also in all other matters connected with the building. It selected, appointed, and dismissed all architects, concluded contracts, and it does so still. The most interesting part is, that the minutes of proceedings of this administration exist in an uninterrupted series, and it may be learned from them how far German art influenced the constructive form of Milan Cathedral. It has been affirmed formerly, with great emphasis, that the cathedral was built by German masters. This is not correct. It is, in its present form, nothing else but a good Lombard church, with all its constructive advantages and defects. Its forms remind us more of German, sometimes of French, but never of Italian architecture; but the truth seems to be that the men who drew up the plans were Lombards, while, perhaps, Germans or Frenchmen were called in to assist in carrying out the details.

As long as the construction of the colossal outer walls was quietly proceeded with, little notice was taken of the question how the vaults ought to be formed; for those Lombard architects relied much on their mode of keying and fastening with grappling irons. Later, however, some anxiety may have been felt on account of static proportions, and German architects were called in and consulted at various times, and even officially appointed. They were of opinion that the building could not be completed as it had been begun; that some parts would have to be walled up, in order to complete the vaulting according to static laws. The Milanese did not take the same view, and the result was that their cathedral was finished in accordance with the original plans, such as we generally find in Lombard churches. The last time German architects assisted was when Master Fernach built the cupola. In 1858 I was desired by the late Emperor Maximilian to draw up plans for an isolated clock-tower for the cathedral. I complied with the wish, and submitted two designs. Political events intervened, and I believed my drawings lost, until I found out the contrary during my recent stay in Milan. To my great joy, my drawings had been well taken care of in the archives.

A colossal building like Milan Cathedral experiences in a marked degree the least movement made by the earth's surface, as well as the influence of temperature, so that it appears improbable that the roof, consisting of marble slabs, could be kept waterproof. Notwithstanding the most careful execution and preservation, the joints of the pavement will open imperceptibly, water entering the small fissures and finding a way down. It is a fact that in the course of time perfect ditches have formed in the spandrels over the vaults; the vaulting has become damp, and pieces of plaster have dropped in various places. Now, the vaults

* Abstract of a lecture delivered by Ober-Baurath Frd. Schmidt before the Austrian Society of Engineers and Architects, Vienna.

are, as is well known, painted in a peculiar manner, that is to say, with panels of open-work tracery, which, indeed, are excellently executed, but cannot be brought in harmony with our static views of the function of a vault. Although this has perhaps been recognised at Milan, no one thought of undertaking a change in this direction, until large patches of plaster began to detach themselves, and thus brought the question into the foreground, with the choice of either effecting renewals on the old system and mending the existing frescoes, or of breaking with it and adopting a new system of decoration.

The Administrazio del Domo decided, quite correctly, for the latter alternative, and a limited competition was opened, four Milan artists being invited to submit their designs for this decoration. As soon as these designs had been found generally acceptable, they were severally commissioned to execute a pattern on an escutcheon of the vaulting. Those executions were highly interesting, displaying entirely different conceptions. One of the artists,—the cathedral architect,—introduced the old system of a blue ground, gold stars, coloured margins, &c. His treatment showed great taste, but was not austere enough for Milan Cathedral. A second proceeded from the principle that only gold ought to be applied in contrast to the natural colour of the marble of which the fabric of the cathedral consists, and that everything required in the form of colour to enliven the space is conveyed to it in abundance by the painted windows. The two remaining competitors adopted a similar principle in their treatment, but they employed entirely different means of decoration. One made the vaults appear as if constructed of pieces of marble, adding rich ornamental leaf-work along the ribs, the same style of decoration being also used for the keystone. The fourth artist followed a similar system; but he painted those ornaments in gold and colour. The ground was a plain chamois tone. These were the four systems on which we had to decide. As regards myself, I was in favour of the design of the second artist, which I considered the only true solution, and by which the architectonic lines of the arch are traced with gold; this view I advocated before the committee. The result was that these principles were adopted as fundamental for the decoration of the cathedral, the only difference of opinion existing between us being that, while I urged that the artist who had come nearest to the true solution of the problem should be charged with the execution of the work, the other members of the committee thought that the one who had obtained almost the same effect should likewise be asked to submit a second design. We also arrived at the conclusion that it would be advisable to break the great monotony of the vaulting of the nave by figure subjects. As far as I know, work is being proceeded with on this basis, and I have no doubt but that it will be carried out in a rational manner.

A FRENCH CRITIC ON ART-EDUCATION IN AMERICA.

M. REGAMEY, a well-known Parisian painter, on his return from a recent official visit to America, where he had been sent by the French Government to report on the American system of art-education, has published an exhaustive work on the subject of his mission, "L'enseignement du dessin aux Etats-Unis." That the French Government should thus send across the Atlantic an artist specially to inquire into the methods of art-education, or, rather, of the teaching of drawing in existence in the United States, might at first sight seem somewhat strange, were it not that within recent years the subject has received in America, from competent authorities, an attention which gives to their methods and adopted systems a value worthy of the highest consideration. With the energy and enthusiasm which our kinsmen display in so many directions, the question of the value,—commercial as well as æsthetic,—of art-education has been grasped, and, as a first step, the legislature moved to pronounce in favour of a wide extension, throughout the educational system, of the teaching of drawing. All this is the work of only a few years. It was at the Philadelphia Centennial Exhibition that the first results of the movement were placed before the public in such a manner that an opinion might be formed of the success of the methods adopted. These results were encouraging to the highest degree, and the foreign reports on the exhibition flatteringly referred to the energy displayed in the American art-schools. In this success it is gratifying to find that England may take upon herself some portion of the credit due to America. It was largely upon the methods in vogue in this country that the Americans went to work to organise their system of art-education, and it was in great part under a prominent professor in our Science and Art Department at South Kensington,—Mr. Walter Smith,—that the system was placed. When, some years since, the movement was set on foot, it was soon recognised that the elements necessary for its guidance were utterly wanting in the country; but, as usual in similar cases, our cousins looked across the Atlantic in search of the most able available assistance. In Professor Walter Smith was secured an enthusiast whose name has long been associated with the question of the desirability of a wider spread of art-teaching among all sections of society.*

Once commenced, the movement spread with the rapidity to which, in connexion with things American, we are at length commencing to cease to express our astonishment. It was not alone in Boston and New York, already largely provided with the means of art-instruction, that the interest manifested itself; it crossed from town to town the whole continent, and Chicago, Cincinnati, and San Francisco have all aided warmly to help on the cause. Schools of art, institutes, libraries, and museums have sprung up in every direction, all largely attended and fostered. The interest and progress in art in America, in fact, aided as it is there by the wide spread of culture and the absence of the all-absorbing centralising influences so powerful in the countries of Europe, is only one more of the proofs of the energy and wisdom displayed in so many circumstances by our kinsmen beyond the sea.

The systems of art-education adopted in America having, at the Philadelphia Exhibition of 1876, attracted the attention of the French Government,† it was, doubtless, in accordance with the recommendations of the Commission that M. Regamey was despatched, in 1879, to the United States, to prepare his report on the subject of art-education in America. This task the author has accomplished, with no small amount of skill. An artist and a traveller, who, indeed, owed his first recognition by the French art-public to his startling sketches of Japanese life and character, M. Regamey was ably fitted for his mission. He traversed a considerable portion of the American continent from New York to New Orleans, delighting numerous audiences in the cities through which he passed by a series of lectures of a novel nature, and for which he had gained in Paris no small reputation. His book is not confined alone to the subject of its title, but, as may well be imagined from a French writer, offers many amusing and instructive digressions on the various features which could not fail to strike an observant traveller in a country like America, which, in its busy, practical life and commercial activity, must have offered to him such a striking contrast with the old kingdom of Japan. But in these digressions M. Regamey does not neglect the subject of his mission, which his work amply fulfils. The style is facile, the tone frank and agreeable, with nothing teachy or pedagogic about it.

The purely practical value attached to the question of art-education, in its bearings on the artistic productions of the nation, is one of the features which we see most forcibly attracted the attention of the author. It has long been the pride of Americans to look forward to the time when they will cease to be in the smallest degree dependent on the Old World. In the United States it is felt that there is no need of anything or anybody; the country produces everything, corn, cotton, sugar, wine even, cattle, coal, iron, wood, gold, and silver; the soil is scarcely as yet touched. There is only one want, a want of hands, which emigration is daily supplying. To education, in its widest sense, is left the rest, and on its influence the future reposes complacently. This spirit of independence, largely fostered throughout the States, has of late developed itself in the direction of art-production. It is not long since that in these columns the expression of this feeling was referred to, when the report of the New York Metropolitan Museum warmly urged that "the time has certainly arrived when America should cease to be dependent upon foreign production of beautiful work in any and every department of industry, when American youths should have the facilities for learning how to produce beauty which German, French, and especially English, youths have in technical schools. . . . . If American industrial art is to rank with that of European countries, it can only be by having educated artisans."* Educated artisans it is the aim of the American methods of art-education to produce; they will endeavour, it is evident, to steer clear of the rock on which so much of the art-education of England and the rest of Europe has so far been, and is still being, wrecked, the production of a mass of ill-formed, ill-educated, disappointed "artists," in the sense of the word, such as it is generally understood; dreary "flashes-in-the-pan," who serve to swell the ranks of the ever-increasing army of useless factors in our national prosperity and advance. It is with a view to forming practical art-workers that the spread of art-education has so far been encouraged by the legislature in the United States, and it is purely in this practical light that the question has been considered. It is found that an enormous sum is yearly expended in the purchase of luxuries and products of art of European origin; the Americans now wish to possess their own art-workers, and encourage a consumption of home products. This utilitarian view of the question need have nothing surprising in it. There exists in America a strong undercurrent of healthy æsthetic and literary culture amply sufficient to counteract what might appear to be the too practical nature of the art-education so far afforded. There will always be the class of earnest art-workers to whom Europe will hold out its charms, and with whom the traditions of the Old World will always be sacred; but the expressed general sentiment possesses at present a strongly-marked practical character. It is not so long since, at the opening of the new house of the Metropolitan Museum at New York, that Mr. Choate, in referring to the six millions sterling yearly sent to Europe from America for art-products, asked why the country should be obliged to continue to pay this tribute, when, by the education of native workmen, it might be avoided.

Efforts have been to some extent made in this direction, efforts in which are plain the extraordinary results attendant on that spirit of private initiative which our kinsmen largely owe to their Anglo-Saxon descent. Not only the States, but the towns throughout the Union, have taken up the question; societies and institutes have sprung up, it being calculated that since the War over six millions sterling have been expended by private generosity in this direction alone. The entire freedom from legislative restraint,—which, of course, M. Regamey as a Frenchman amply dwells upon,—possesses the great advantage of allowing of constant improvement and of changes in accordance with the necessities and conditions of each case. The only point in which the Legislature have had a word to say is in declaring obligatory in the schools the teaching of drawing; every town of 10,000 inhabitants being further obliged to support an industrial art school. As is noticeable in the matter of general education, every one has been only too happy to adopt the new method, and in the course of a very short time it is confidently expected that every portion of the country will be provided with its organised system of art instruction.

It is needless here to speak at any length of the various methods adopted; M. Regamey's work supplies all the necessary information to those interested. The writer, in addition to lengthy explanations of the systems in vogue, reproduces a number of representative pupils' drawings from each of the successive classes, studies from the antique, from the life, and the classes of modelling and anatomy. Suffice it to say that accustomed to the French system, the author

* As far back as 1860 Mr. Walter Smith published a lecture delivered by him at the Mechanics' Institute, Keighley, on "The Importance of a Knowledge of Drawing to Working Men"; since then he has published several invaluable reports on the systems of art-education in vogue in France, as compared with our own; while his works on industrial drawing and art-education justly hold a high position both in America and in this country.

† The portion of the French Report relating to this subject has been reproduced and published by Professor Walter Smith, in a separate form, "Industrial Drawing: the Opinions of the French Education Commission," &c. Boston, 1879.

* See *Builder*, vol. xli., p. 571.

was surprised at the simplicity of that adopted in America. Routine and tradition are two obstacles which, on the other side of the Atlantic, have not,—as yet,—come to interfere with progress. A large share of independent action is left to the pupil, who is gradually led up from easy tasks to those more difficult, the artistic intelligence being especially developed through the combined exercise of the eyes and the mind; some of the professors even adopt a system of drawing from dictation.

This is eminently characteristic of the whole movement. There exist in practice throughout the country several systems of art instruction, and each has its advantage, and is supported by competent authority. Drawing throughout Massachusetts has been introduced into all the schools, and there is already what may be termed a native supply of professorial talent.* The work of the schools has been further assisted by the formation of the numerous special schools and art institutes which have sprung up within recent years all over the country. Nearly every large city has a number of these institutions. Boston has possessed, of course, for a long time several important and interesting art-institutions, the value of which has recently been largely increased by such practical additions as the school of industrial design recently founded by the manufacturers of the city, a school formed somewhat after the fashion of the *Musée Industriel* at Mulhouse, to educate native weavers and designers of woollen stuffs and cottons. New York is not behind Boston, with its Academy of Design and Cooper Institute, and Metropolitan Museum, founded somewhat on the model of our South Kensington Museum. Baltimore has its Society of Decorative Arts and the Peabody Institute; Chicago, its Academy of Design; but it is needless to name the numerous art institutions which now exist throughout the States, and all eagerly endeavouring to supply themselves in Europe with specimens of old art to serve as models for the production of a new art, which they feel can alone possess originality in proportion to its acquaintance with the works and traditions of the past. Young American painters, sculptors, and architects are crowding every artistic centre in Europe, and out of all this enthusiasm and energy, out of all the patronage practised, something before long must be produced. It was some German philosopher, we believe, who sighed out the statement that America was born at the sunset of humanity; rather let us trust, as she does herself, that she is born at the rise of a new existence, when the industry of the world, still young after its æons of toil, is about to take a fresh departure.

M. Regamey's work in more respects than one is most instructive, and though, like so many other books of its class, it is doomed before long to see its information rendered out of date, it will serve the inquirer and the historian of the future with one more element of invaluable evidence of the steady and earnest progress of the wonderful continent beyond the Atlantic.

MONOLITHIC CHURCHES IN ABYSSINIA.

AT the last sitting of the Paris Academy of Inscriptions and Belles Lettres, M. Raffrey, who has recently returned from his travels in Abyssinia, gave an interesting description of a number of churches he had seen there which are hewn out of the solid rock. These unique structures he found in the town of Lalibeba, the capital of the province of Lasta. The place lies in a remote and out-of-the-way region, and is situated on the side of a rocky mountain. It is regarded as a holy city by the Abyssinian Christians, and is visited by numerous strangers who come to pray near the sacred relics there preserved. There are ten churches in the city, but they are not conspicuous to the eye of the traveller, inasmuch as they form integral portions of the mountain. The mode in which their architect had proceeded in constructing them was, in the first place, to have the stone quarried away in such a manner as to leave an immense solid block of rock in the middle. This block, of course, still continued to form part of the mountain. The next step was to give this mass of rock externally the form of a church. It is, in fact, so finished that it is made to appear as if built of ordinary cubes of stone masonry, the junctions of the different stones being imitated very plainly. Finally, the block was hollowed out, the apertures being so made as to serve for doors and windows. The interior exhibits pillars, vaulted roofs and arches, all being executed in a neat and workman-like manner. These churches are, accordingly, a species of monolith, and appear to be almost unique amongst works of architecture. M. Raffrey, in his paper, gave a special description of each of the chapels. He stated that the architect and builder of them was a certain Sidi Meskal, who had constructed them with the assistance of a body of Egyptian and Syrian workmen, the chief implement used being the pickaxe. The tradition of the place is, that all these churches were constructed within a period of twenty-three years.

* It appears that about 95 per cent. of the school population has been induced to draw. About one-third of the school population continues in the higher classes.

THE HAGIA SOPHIA, CONSTANTINOPLE.

A DETAILED report on the condition of the Hagia Sophia, which has become worse since the repairs completed by the architect Fossati in 1879, is published by the *Norddeutsche Allgemeine Zeitung*. The serious danger was first noticed by Prof. Bernardo Ferrari, honorary member of the College of Engineers, Genoa, and it is owing to his efforts that the attention of architects was called to the matter. A Commission appointed to inquire into the state of the edifice, however, could do no more than agree to a report of Ferrari's, which points out the danger, and insists on the necessity of a thorough examination being made of the building by a competent architect. It is now stated that, entirely ignoring Prof. Ferrari, an Italian company has made proposals to the Sultan for carrying out extensive repairs, and, according to the report, it is not at all improbable that the dentist of his Majesty will be placed at the head of an undertaking upon which depends the preservation of one of the most interesting edifices in the world!

THE GRAND STAIRCASE OF THE PALACE AT WURZBURG.

AMONGST the numerous examples which Germany possesses of mansions erected in the style of the later Renaissance, perhaps none are more pleasing than the palace (called the Residenz) at Würzburg, in Bavaria. This stately and magnificent building was formerly the Episcopal Palace of the Prince-Bishops of Würzburg, and was commenced on the 22nd of May, in the year 1720, by Prince-Bishop Philip Francis von Schönborn. In the *Würsburg Chronicle*, however, he is spoken of as *John Philip*. The works were continued by Prince-Bishop Christopher Francis von Hatton, 1724-1729, and were completed by Prince-Bishop Frederick Charles von Schönborn, 1744. The architect was Johann Balthasar Neumann, who succeeded Petrini as State architect. The Palace is of vast size, and encloses within its walls one church, five halls, 312 chambers, twenty-five kitchens, and a theatre. It is lighted by 947 windows, and is constructed of very beautiful light sandstone.

The most interesting feature about the building is the great entrance-hall with the principal staircase, of which we give a view. This hall is divided into a nave and aisles on the ground-floor by the columns supporting the upper flights of stairs; but above these it is all in one span. The architect has taken great pains to mask the soffits of the upper flights of the stairs, which he has effected by means of a singular arrangement of vaulting. In order to make the vaults range with the stairs above, each compartment has to be differently treated. We cannot help thinking that it would have been better to have had the columns of different lengths, and to have kept the vaulting similar over each bay; be that as it may, Neumann must have the credit of having tried a very bold and original experiment, and one well worthy of study. Of course, his object was to keep the capitals of his columns all in a line, and such a treatment is undoubtedly more agreeable to the general feeling of Classical architecture than the plan usually adopted of increasing the height of each succeeding column, or that of making equal columns stand upon a raking podium. The great defect of the system is the contrast between the cross vault and domical vault, which certainly breaks up the harmony of the general design. It is interesting to compare this staircase with two others which we have illustrated in the *Builder*,—one is that of Ashburnham House, supposed to be the work of Inigo Jones, and the other is a Gothic staircase at Ratisbon. Of course the Wurzburg staircase is very much larger and far more costly, as to material, than the others, but still it may be questioned whether, for domestic purposes, it can be said to have the advantage. It is, however, splendidly suggestive for the approach to a great theatre or concert hall. It would be difficult to construct a staircase which would be safer in a panic or sudden rush of people, and this makes it well worthy of study by builders and architects just at the present time, when the question of safe egress from our great places of public amusement is fraught with such painful interest to all who are connected with the management or arrangement of such buildings.

"WHITE SWAN" TAVERN AND RESTAURANT.

THIS building, which is situated at Nos. 17 and 18, Temple-street, Whitefriars, close to "The Temple," has recently been completed for Mr. John Finley. The ground-floor is constructed wholly in Box Ground stone, and the upper part is faced with red bricks, and has stone dressings and cornice. Entering the building on the west side, there is an extensive luncheon and dining-bar, communicating with a coffee and smoking room in the rear. There is also a counting-house or private room for the proprietor's use, adjoining which is the lift and cellar entrance.

On the east side there are two large public compartments, entered from Temple-street, with an additional entrance from Glasshouse-alley, at the side of the building, and in communication is a commodious room set apart for the use and convenience of workmen for purposes of dining, &c. The yard approached from Glasshouse-alley has conveniences.

Passing through the central and principal entrance, the upper part of the building is reached. On the first floor is a dining-hall capable of accommodating 100 persons, entered through an elliptical-headed opening fitted with a pair of swing-doors executed in pitch pine. In the rear is a private smoking-room.

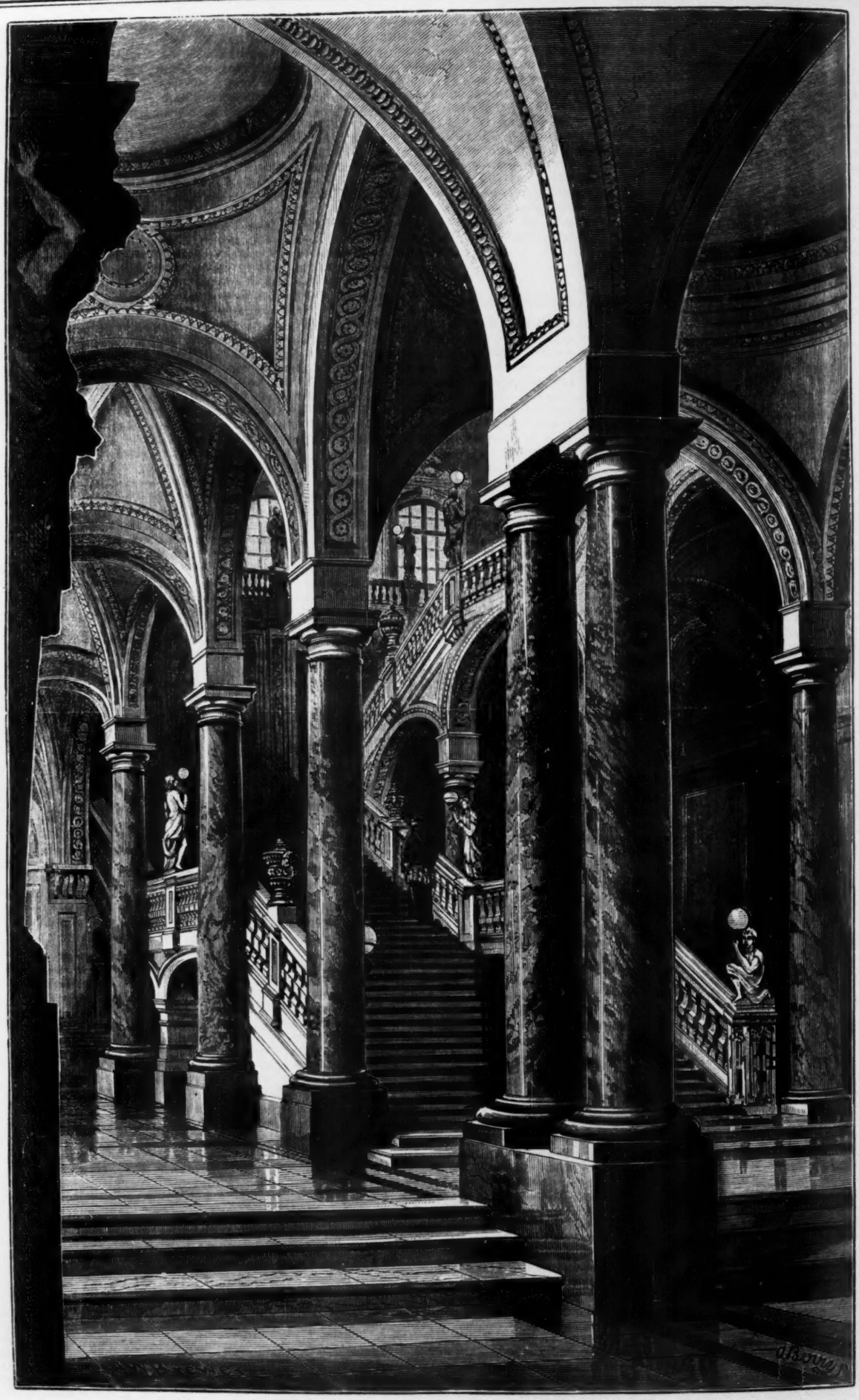
The second floor comprises a billiard-saloon, similar in dimensions and fittings to the dining-hall below, fitted with a table by Burroughes & Watts; also a large private room in the rear, and lavatory with all conveniences.

The third floor is occupied in the front portion by bedrooms, and at the back by the culinary department, the kitchen being fitted with a lift communicating with the various floors below.

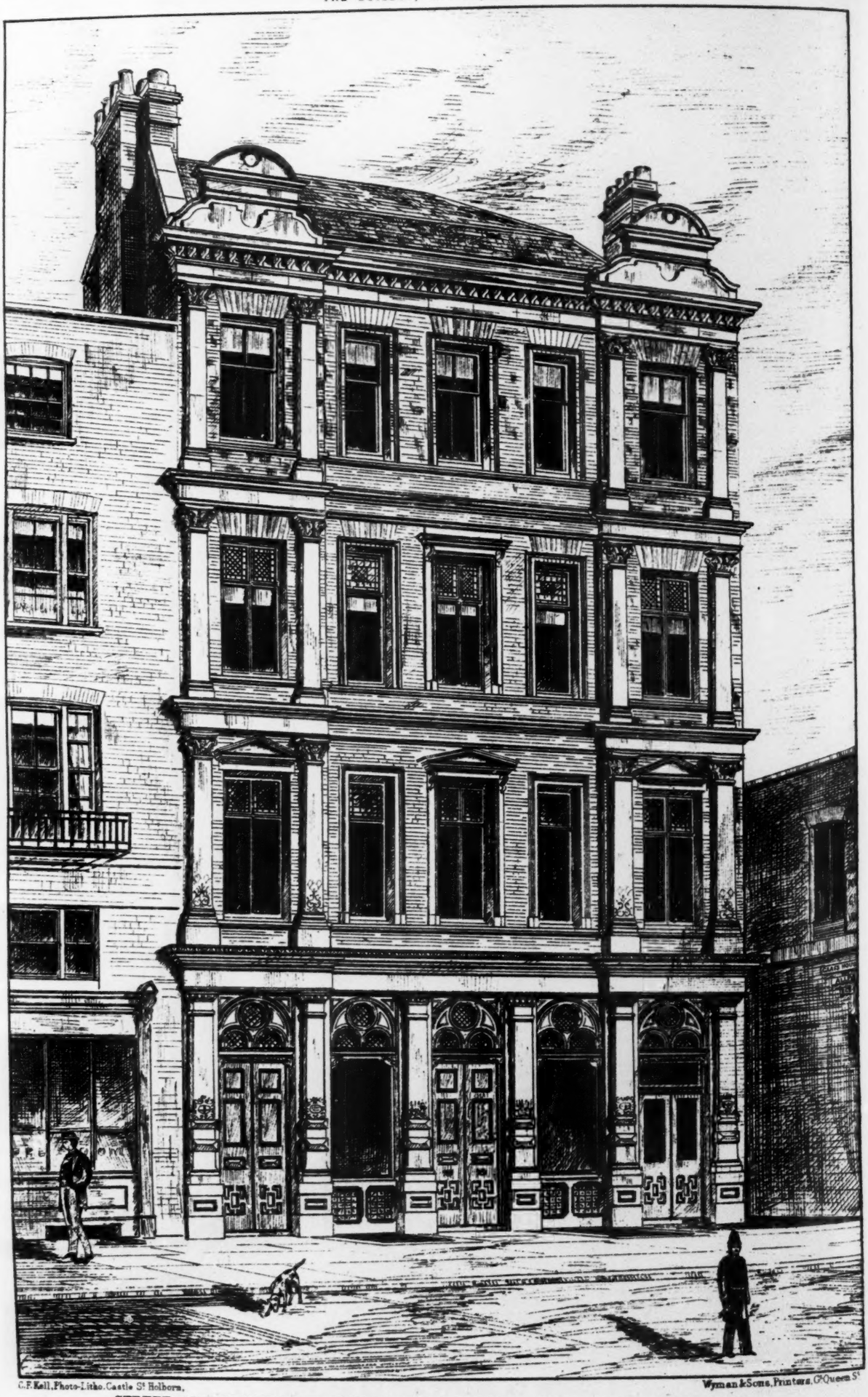
The fourth floor contains further bedroom accommodation.

There is good cellarage in the basement. The building has been erected from the designs and under the superintendence of Mr. F. Adams Smith, architect, of 28, Finsbury-circus, the contractor being Mr. Richard Conder, of Ball's Pond-road.

The New Pulpit at the Aberdeen Roman Catholic Cathedral has been made by Mr. Harry Hems, and will cost, including the canopy, about 300*l*. The whole of the structure is of old English oak—the pillar shafts in the pulpit proper being made of oak which originally formed part of the oak work in the choir of Salisbury Cathedral. The pulpit is octagonal in shape, and has a pedestal base. The outside of the enclosure for the preacher is formed of panelled framing and pillars at the angles of the octagon; the panels are each enriched with a figure subject in bas-relief. The canopy is also octagonal, and rests upon a back of panelled framing, and is also firmly fixed into the stone pier against which the pulpit stands. The canopy has a gablet and cusped arch on each side of octagon, and is surmounted by a square shrine with pillars at the angles, having flanking figures of the four Evangelists, and the figure of our Lord in the shrine. The shrine is surmounted by a high crocketted spire, terminated by the figure of an angel sounding the trumpet, the whole standing about 24 ft. high above the floor of the nave. The design of the pulpit was furnished by Messrs. Ellis & Wilson, architects.



THE GRAND STAIRCASE OF THE PALACE AT WURZBURG.

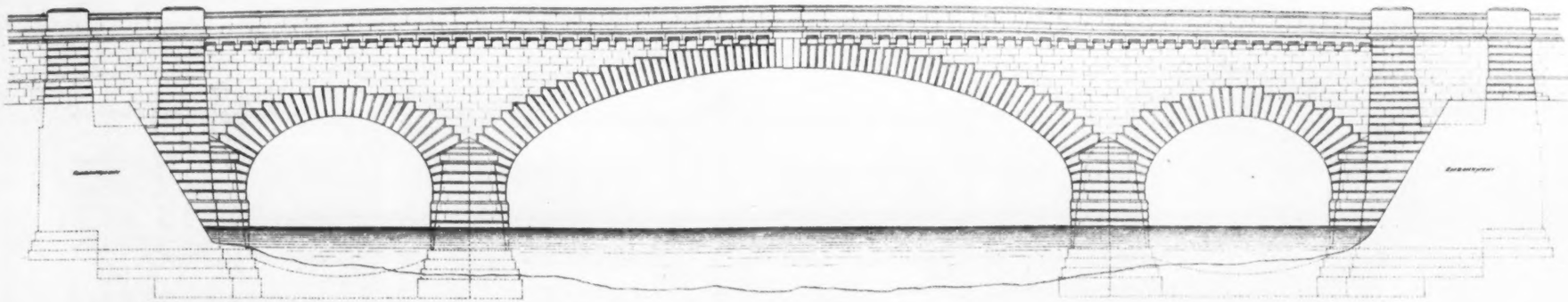


C.F.Kell, Photo-Litho. Castle St Holborn. Wyman & Sons, Printers, 74 Queen St

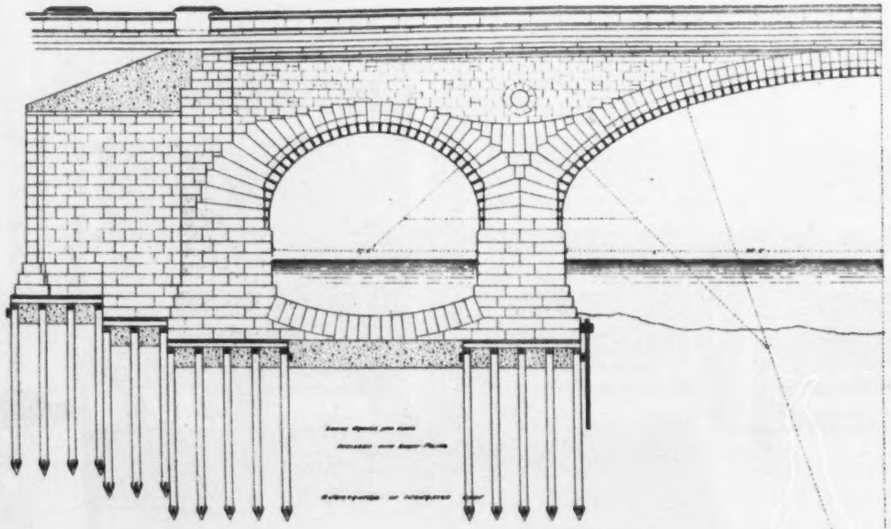
STREET ARCHITECTURE: TAVERN, WHITEFRIARS.—Mr. F. Adams Smith, Architect.

DRAWING No 1.

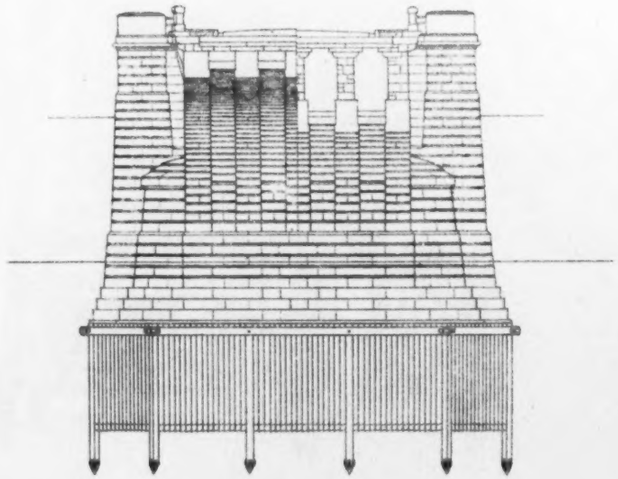
DESIGN FOR A STONE BRIDGE.



ELEVATION OF BRIDGE



HALF LONGITUDINAL SECTION OF BRIDGE



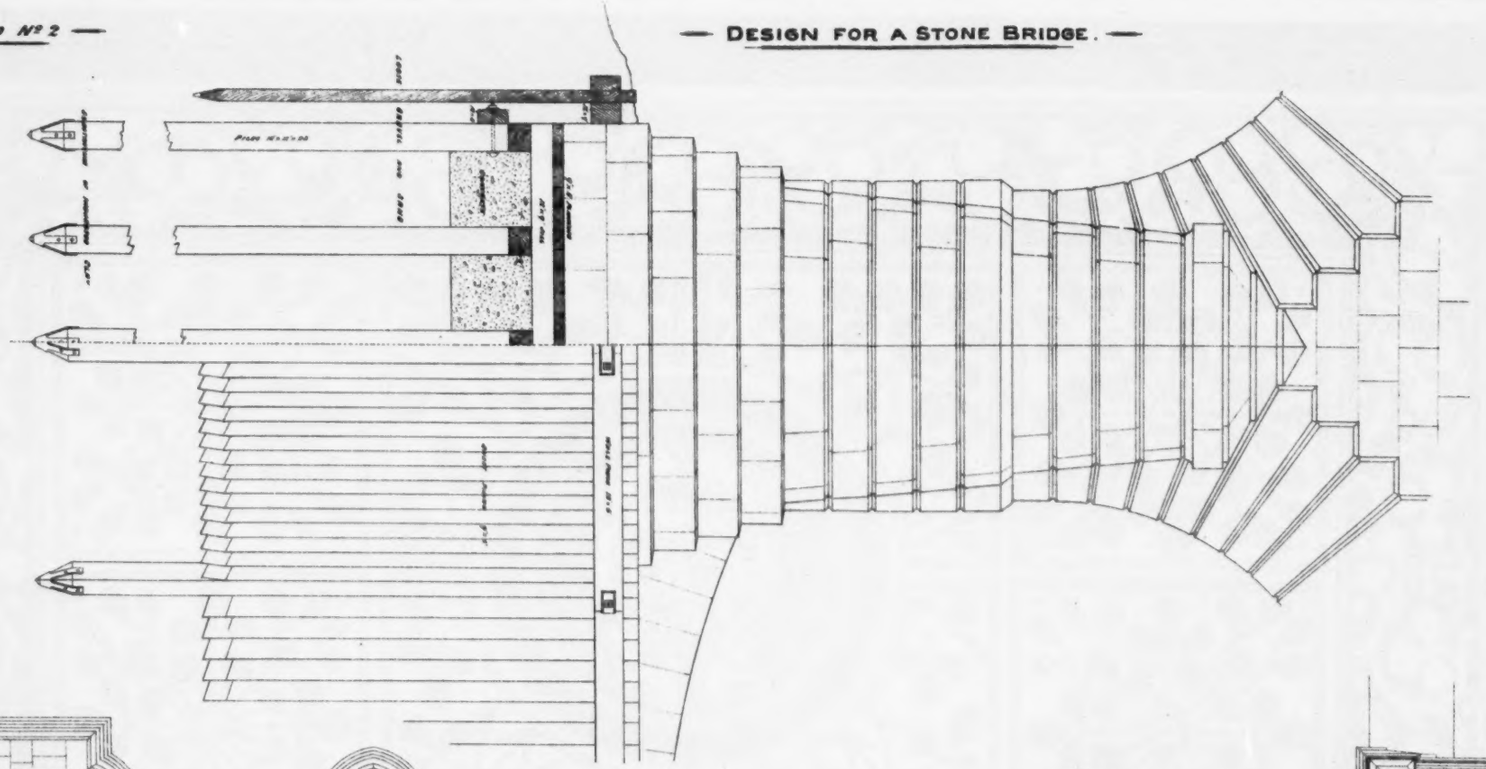
TRANSVERSE SECTION THRO' CENTRE ARCH
HALF THRO' CROWN AND HALF THRO' SPRINGER

Whiteman & Bass, Photo-Litho 236, High Holborn.

Wyman & Sons, Printers, 6 Queen St.

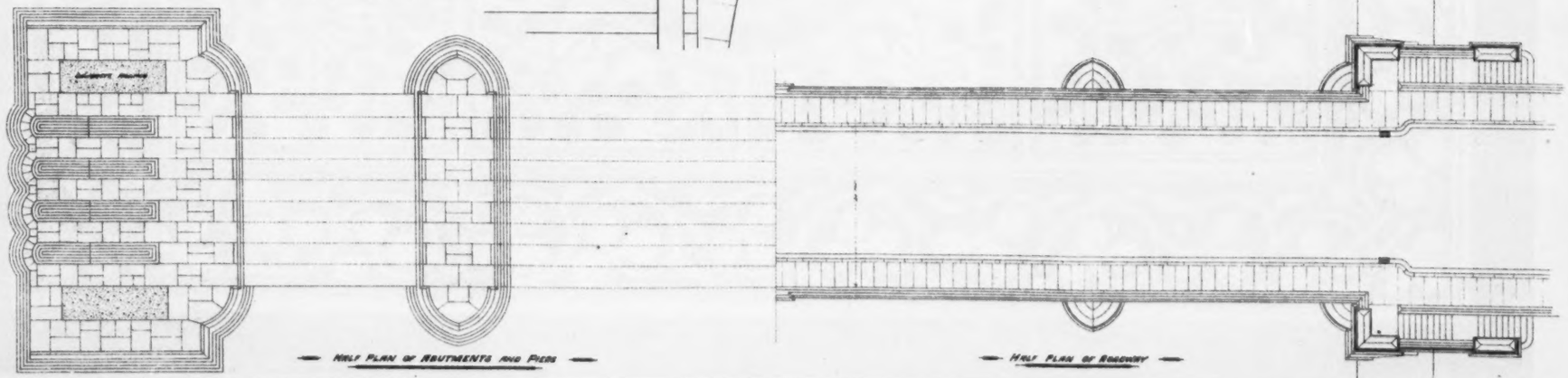
— DRAWING No 2 —

— DESIGN FOR A STONE BRIDGE. —



— ELEVATION OF PIER —

SHOWING HALF ELEVATION AND HALF SECTION OF FOUNDATIONS.



— HALF PLAN OF ABUTMENTS AND PIERS —

— HALF PLAN OF ROADWAY —

Whiteman & Bass, *Photo-Litho* 236, High Holborn.

Wyman & Sons, Printers, G^t Queen S^t

C.F.Kell, Photo-Litho. Castle St Holborn.

Wyman & Sons, Printers, Gt Queen St

DESIGN FOR A STAMPED LEATHER BOOK-COVER.—By G. C. Haite.

PRIZE DESIGN FOR A STONE BRIDGE.

GRISSELL GOLD MEDAL, 1882.

WE illustrate this week the design for a stone bridge, to which the Grissell gold medal has recently been awarded by the Royal Institute of British Architects. The conditions of competition required a stone bridge for road and foot traffic, 30 ft. wide between the parapets, with a waterway of 140 ft., and a gradient not exceeding 1 in 20, the river, 200 ft. from bank to bank, to be non-tidal, with an extreme depth of 10 ft., and navigable for barges, the banks to be on a level, and 20 ft. above the ordinary water-line.

The principal feature of the design is a wide central arch, of 85 ft. span, designed to leave the deeper portions of the river available for navigation, and to facilitate the construction of the piers by their proximity to the shore. The necessary height is obtained by an easy gradient of about 1 in 30, and by raising the approaches from which communication with the banks is provided by flights of steps. By setting the parapet walls out on corbels the required width of roadway is obtained, together with an architectural effect of light and shade and a saving in the width of the bridge works below. The roadway is carried over the bridge on a series of spandrel walls built up from the main arches, which are turned with a corresponding series of arch ribs, well bonded together; the spaces between being not required for constructive purposes, are filled in with lighter stonework, an arrangement designed to increase the architectural effect and diminish the quantity of material, and consequently the weight on the piers.

The bed of the river is assumed to consist of loose sand and gravel to a depth of several feet, with a substratum of indurated clay, on which, by means of piles, the foundations are constructed, the piers and inverted arches under the small openings being surrounded with sheet piling, to prevent the lateral escape of the loose material by the action of the water.

The author of the design is Mr. H. Phelps Drew, 17, Sulgrave-road, West Kensington.*

DESIGN FOR STAMPED LEATHER BOOK-COVER.

THE accompanying design for a stamped leather book-cover is given as suitable for a set of volumes or for a private library, space being reserved in the centre of design, as shown, for owner's monogram or crest. It may, perhaps, help to revive interest in a branch of art which has been neglected of late. Without laying claim to any great merit or originality, it may be regarded as suitable for its purpose, a point which is quite lost sight of in the majority of designs of the present day.

A CHAT ABOUT HOUSE BUILDING.†

THE main use of a house is, of course, to protect us from the heat, cold, and wet, and a building that fulfils these conditions best most nearly answers the purpose for which houses are erected. In order to discuss the matter clearly we will divide our house into its several parts, and as the foundations must be first laid down, we will treat of these in the first place.

Foundations.

A calculation should be made of the weight of the materials in the proposed building and its probable contents; this would be the weight the foundations must have to carry. Then a margin allowed for safety, which would vary under different circumstances: for instance, a house on a hill would be exposed to a rocking motion from the wind that a house in the valley would be less exposed to; and supposing the margin to be for the house in the valley five times its average weight, and on the hill ten times, I think that safety-margin would be quite sufficient.

I know it is not usual in building houses to make these calculations, but I do not think the usual method is best in this instance; for if an engineer built a bridge he would be able to tell you the exact strength of every part, all the materials would have to pass the test, and would be accepted or rejected accordingly. If a shipbuilder built a ship he would follow the same law, and both would be but copying nature, who never uses surplus materials.

A little reflection will, I think, show you that to use materials in a haphazard way is not true economy; and if you put foundations 18 in. thick when 12 in. would answer the same purpose, you are wasting one-third of your materials, and, from want of care, using for the foundations of two houses materials that would, if more judgment had been used, been sufficient for three.

I want you, please, to keep this principle in your mind,—economy of materials and labour, because it is the key-note of all I have to say, and is, in fact, the only point I know of in which great improvements in house-building can be made.

Having found the weight of your structure and added the margin for safety, your next step would be to provide yourself with a crushing-machine to test the strength of your materials. This need not be an elaborate affair: a lever-machine can be constructed with an iron girder and a sliding weight, on the principle of the steelyard, at a trifling cost. The usual test used for Portland cement is a tensile strain. This may be all right, I dare say it is; but I think you will agree with me that, for materials that are to be used in compression, a crushing test is more satisfactory than a tensile one.

Now, then, having decided what weight we have to carry, and having prepared our testing-machine, the next point is, what shall we use for our foundations?

This is a question that can only be answered on the spot; any hard, coarse material will do,—either gravel, flints, rubble, local stone, or whatever comes handiest; the only thing to be guarded against is that we do not, for the sake of cheapness, use a soft and unsuitable material; but here our crusher will help us. Now, with what shall we bind our material together? Shall it be lime or cement, or part of each?

The better plan will be, if the foundations are important, to make a number of experimental blocks, let them stand some time, and then test them by crushing. It might be fairly assumed that materials that give the best results in these instances would harden in the same ratio; and I feel quite sure the result of those experiments would be to prove, in many cases, that the local materials, although the cheapest at first, would not be the most suitable, in all cases, for the purpose.

Having decided what the foundations are to be composed of, and of what thickness they are to be, the question of depth has next to be settled.

When the subsoil is of gravel or chalk, firm and dry, nothing can be better; when, however, it is irregular, care must be used, or the building will settle unevenly, and distortion will follow. It is most essential, when the foundation is at all questionable, that hoop-iron bonds should be imbedded in the foundations; and I have seen very heavy buildings erected in London on the made ground without excavating to the natural subsoil, when, by taking this precaution, the entire building has settled in one without distortion or flaw of any kind.

The buildings I speak of were workmen's model dwellings, and the method was adopted by a late esteemed friend of mine, Mr. Matthew Allen, from economical reasons. I am not recommending this system to be adopted, as, without great care, it might not succeed; still, I think the fact that it has been successfully done should be placed on record.

If the soil is at all damp, the wet will soak into the foundations, and be drawn up into the walls; a wet outer wall is a most annoying result, which must be obviated by a damp course covering the whole of the foundations, and forming the bearing for the walls.

Any material impervious to wet will do for this; but the cost of rectifying any defect is so great that it would be false economy to use anything but the best kind.

I have seen two courses of slates in cement, felt saturated with pitch, liquid asphalte, glazed tiles perforated lengthways, and many other contrivances for effecting this purpose; but for buildings not too heavy I like the perforated tiles the best, as ventilation is combined in this appliance, and any defect is more readily perceived. Our testing machine would show us what weight these tiles would safely carry. And here I would interpose a remark about testing which you may not be aware of.

I was informed, in answer to a question, by a gentleman who has had more practical knowledge of testing materials than any one I know, and who is considered the great authority in the matter, that he has found hundreds of times that a test made on a small cube bears the same relation to the strength of a larger surface as the size of one bears to the size of the other. Now, suppose a cubic inch of material is crushed by the pressure of one ton, as there are 144 in. in one square foot, it follows that it would take 144 tons to crush a tile of the same material 1 ft. square and 1 in. thick.

This is a most important matter for our purpose, as we can, by comparatively simple means, obtain results that, but for this rule, would, owing to the cost and bulk of the necessary machinery, be quite beyond us.

We have now put in our foundations, put on our damp-proof course, and the next thing we have to do is to commence our

Walls.

Now we will ask ourselves,—What are the walls for, and what have they to do?

They have to carry the floors and the roof, and they have to keep out the heat, the cold, and the wet.

To carry heavy weights, are bricks and stone the best material? Well, engineers would say at once, "No"; iron is best, as its strength is many times greater than the best bricks or stone. What! iron walls, you say! No, not quite that; but iron stanchions wherever weight has to be carried.

Let us take a walk down a main street and look at the shops,—those massive buildings,—some brick, some stone; and here they are, all stuck up in the air and standing on iron columns, looking ridiculously small for the weight they have to carry; and if for trade purposes iron columns and an iron breastsummer is used on the ground floor, why not on the second floor, where there is less weight to carry? If on the second, why not on the third and fourth, and why not dispense with the brick and stone in the front altogether?

If this arrangement will do for the front, why not for the back and the sides? In fact, why not put up a skeleton house all iron uprights and cross-pieces, and leave the filling-in for after consideration?

This plan will do equally well for erecting houses. Having formed the foundations, raise on them a skeleton framework in iron of the building you are about to erect.

The strength of iron is well known, and many large iron dealers now publish tables giving the actual strengths of the different sections they sell; by this means it will be easy to calculate with certainty beforehand the strength your wall will be, so that nothing need be left to chance, and no risk need be run.

In many cases wood may be substituted for iron, as it would be protected inside and outside by the inner and outer skins; it would last as long as the wood studwork or lath-and-plaster partitions, which, as is well known, often last for two or three generations.

There ought to be no difficulty in keeping the weather out; the shops do it most effectually with glass, now mostly plate, ¼ in. thick; but in old shop-fronts you will find sheet, and in older ones crown, no thicker than a sixpence, yet keeping out the wet better than your brick wall or your stone wall, however massive you may make them.

This teaches us that the surface of the outer wall must be waterproof. In some old houses the bricks were glazed, the joints then would be the difficulty; but a glazed surface is not pleasant for walls; no one likes it, and I know of no substance that combines all the qualifications for an outer wall equal to Portland cement.

We have travelled along very comfortably so far, and I should be sorry for you to say, "Now you are going to mount that hobby, I'm off;" so, if you will kindly listen to me, I will promise not to mount my hobby, only to trot him up and down a bit, just to show off his points, and what he is capable of. Well, here is a material you can mould into any shape; you can colour almost any shade; you can carve to any design. Any plasterer or bricklayer has some knowledge of its properties; it can be purchased almost anywhere; it is harder than stone; quite impervious to wet; practically indestructible, and, until you can tell me of something better, this is the material I should recommend. I wish people were not so prejudiced against new materials. Old and well-tried things are not to be lightly thrust aside, I know; but when they have failed again and again, when our best men have erected buildings in exposed situations of

* Another page of details will be given in our next.
† By W. H. Lascelles, Builder.

brick and stone, which, in spite of all precautions, have not proved waterproof, I think, and I know you will agree with me, that another system, which promises to rectify the defects at present existing, should have a fair trial.

The outer skin should be strong enough to withstand ordinary wear and tear, and I think 1 in. is sufficient thickness for the ground floor, and less than this would do for the upper floors, say ¾ in. I would make the cement in slabs or tiles, say 18 in. by 12 in., and about ¾ in. thick, with a roughened face; they can be fastened with wire to light iron uprights, or with screws to wooden stanchions, and the outside can be finished as rough cast, with red tiles the size of bricks, with slab-tiles resembling stone, with thin sheeting framework, as half-timber work, or in any way your fancy may suggest. I know I am on ticklish ground here, so I will leave you to do as you like. And now I have trotted my hobby a bit, trot out your own, and put what you like, how you like, and as you like.

Now we will talk about the inner skin, and there I would put the same plain cement-tiles, with the roughened face, and would finish with a coat of lime and sand in the usual manner. We have been taking such liberties with ordinary construction that I think it is time to come round a bit, and admit there are some things we cannot improve on, and I know of nothing better than lime and sand for inner walls, as it gives a good hard smooth surface that will absorb any ordinary moisture a room is likely to contain without showing spots of damp.

The hollow space between the inner and outer skin we get by this system is of great service to us, as the air thus confined is an admirable non-conductor of heat and cold, and a thin hollow wall is as good a protection against extremes of heat and cold as a thick solid wall, and as a protection against damp it is far better.

Floors.

We will take the basement floors first, and start with the assertion that wood for this purpose is wrong, because, being next the earth, it decays sooner or later, and the damp decaying air is continually being drawn through the floor-board joints by the fire.

Every basement floor should be in one piece, and air-tight, and should be raised above the ground, because if there is no air-space underneath, and it is in contact with the cold earth, any moisture in the atmosphere is condensed on it, and it is almost always damp, which has a most uncomfortable appearance, and renders it unfit for most purposes.

A good plan is the very, very old one of connecting the space under the basement floor with a flue in the chimney, and letting the air that passes underneath pass round a furnace on its way in. By this means it is warmed, and the warmth benefits all the building; in that case the hot air can be allowed to circulate between the double outer walls before it enters the flue, and the entire apartments are clothed with a blanket of warm air. This is, of course, the best plan.

Cement looks cold for a basement floor,—looks, in fact, much colder than it is; it can, however, be covered with wood, either as boards or parquetrie, or with carpet, felt, or matting. The great thing is to keep the floor and joists away from the ground. Have a floor in one piece, impervious to air and damp, with a space under, and cover it with what you like.

The air-space, if not connected with a furnace, should have air-bricks in the outer walls to promote circulation, and if connected with hit-and-miss air-bricks by the grate, can be kept continually renewed by the draught from the fire, or it can be carried into the fire.

So much for the basement; now we will speak of the other floors, and we will lay down the law that these floors must be fireproof.

By fire-proof I mean that if the furniture usually kept in a kitchen should by any means take fire, the ceiling and floor above should be so constructed as to prevent it spreading in other directions.

I would take nothing for granted in this matter, but would satisfy myself by direct experiment that this result had been attained. I do not mean I would try to burn down the house to see if it were all right, but when the house was in the process of construction I would put as much wood and shavings as would represent its contents and rather more, and set it alight, letting the flames play out of the windows, for I know no way of making windows fire-proof, except by using iron shutters. There is not much difficulty with doors, if the door is made in two thicknesses, with a sheet of iron between, that would be sufficient: this, also, I would test by actual experiment.

There is nothing more comforting than the feeling that all is safe. When you have an uncomfortable feeling in the middle of the night that there is a curious noise downstairs which sounds like fire, it is a great thing to feel that there is no cause for alarm, and that if a fire should have broken out it cannot extend from the room where it has originated.

Beyond laying down the proposition that all rooms should be fireproof, I do not dogmatise as to the way this should be done; there are numerous ways of doing it. If you accept my doctrine, that is all I care about, but, all things being considered, the cheapest way is the best way, and if this most desirable result can be obtained at the same cost as an ordinary lath-and-plaster ceiling with joists and floor over,—and I fancy it can,—I do not think there can be any doubt as to which is the best plan. So we will take a ceiling 24 ft. long by 18 ft. wide, and see how it can be treated.

First, I would divide the length into three by putting two iron girders across, this would reduce the bearing from 24 ft. to 8 ft.; then I would put iron joists 1 ft. 6 in. apart and 16 ft. long, breaking the joists alternately, and this would be my framework.

Now, if you take a piece of paper and set it out to a scale, you will see how this is done.

The girders may show as beams in the room below, and can be cased in thin wood, or lath and plaster, or cement, or stamped paper, and the joists can either be covered on the under-side with slabs of any of the above materials, or each joist can be cased separately and show below. Wood and stamped paper sound rather queer fireproof materials, I know, but the fact is, no building is absolutely fireproof, but only relatively so, and bearing in mind the proposition I started with that everything should be tested, nothing should be sacrificed to prejudice. I would roughly test everything as I went along. Satisfy yourself that you are right, and do not care a button for what other people say if it will do the work that is required; that is everything, and when you have tried it you will be surprised to find, as I have been, what simple arrangements will withstand any ordinary fire.

Do not place implicit faith on pretty pictures and paper experiments; put them all through the crucible of experiment: it is by experiments all great discoveries have been made, and the results obtained are often quite different from what with our previous knowledge, we have anticipated.

I have called this a chat, and such I wish it to be, but it would be wasting your time as well as my own if I were merely entertaining you with wild dreams that could never be realised, or advising you to try experiments when I had done nothing of the kind myself. Please, therefore, understand, that although I do not want to bother you with figures, I have myself tested the matters I am speaking about, and have quite convinced myself that the thing is right before I have tried to convince you.

We are getting on pretty well; we have put in our foundations, built our walls, put in our beams and our joists, formed our ceilings, and now we come to the floors.

Nothing I know of is so good as concrete slabs laid like paving on the iron joists; they need not be very thick,—an inch will do in most cases, an inch and a half is strong enough for any dwelling-house, and they possess the following advantages: they are fireproof, waterproof, good non-conductors of heat and cold, can be sent by road or rail without much breakage, are inexpensive, and can be laid by any ordinary mechanic. Now there is a testimonial it will be difficult to beat; still I do not preach finality, all I ask you is to try them, and if you think you know anything better try that as well. I do not hold up concrete slabs as invincible: admit the principle that floors must be fireproof, and make them of what you like.

The under-side, if seen, I would plaster with lime and sand; then whiten, or paper or decorate, as you like. The upper side I would make with a roughened surface to take a finishing coat. This might be done in thin parquet or coloured cement, or a parquet underneath in cement centre, or tiles in any pattern. But a plain-coloured cement floor is what I would prefer, although I know people will say, "Dear me, how cold it must be!" Well, I have tried it, and it is not. I have known people who have lived in houses where all the floors, bedrooms and all, were cement, and they will tell you they are most comfortable, and although at first they were prejudiced against them, after this was overcome they liked them better than wooden floors. When you are on the Continent you do not object to the cement floors; you like them because they are clean and cool, and free from dust; you note how easily they can be washed, and how solid and firm they look; you do this because you leave some of your prejudices behind you when you leave your dear old England, but when you return on they go again, and what is very good on one side of the Channel is very bad on the other.*

ST. PETER'S HOSPITAL, COVENT GARDEN.

VISIT OF THE ARCHITECTURAL ASSOCIATION.

On Saturday afternoon last a number of the members of the Architectural Association visited the new St. Peter's Hospital for Stone, Henrietta-street, Covent Garden, which is now so nearly completed that it is expected to be formally opened on the 29th of June by one of the royal princes. The building is being erected from the designs, and under the superintendence, of Mr. J. M. Brydon, architect, and has a frontage of 120 ft. on the north side of Henrietta-street, the back of the building extending for the same distance along the south side of the churchyard of St. Paul, Covent Garden, which is, we understand, about to be laid out in an attractive manner at the cost of the Duke of Bedford. The building comprises six floors, viz., basement, ground, first, second, third, and attic floors. The principal entrance is on the ground floor in the centre of the façade, but there is an out-patients' entrance at the east end. On each side of the principal entrance are two shops, extending from back to front of the building,—a distance of about 30 ft. The basement floor, on either side of the space beneath the entrance-hall, is divided laterally by brick walls, the front and larger portion of the basement, towards Henrietta-street, being appropriated to the shops, and divided by cross walls, so as to keep each shop and basement distinct from its neighbours,—the back portion of the basement, looking out over an open area on to the churchyard, being appropriated for hospital purposes, communication from top to bottom being by means of staircases and lifts. The hospital portion of the basement comprises mortuary, *post-mortem* room, drug-store, porter's bed-room, and store-room. The whole of the main walls rest on concrete, 2 ft. 9 in. thick, and the entire surface of the basement floors is covered with a layer of concrete 6 in. thick and finished with cement. The first floor, approached by the central staircase as well as by the one for out-patients, comprises an out-patients' waiting-room, capable of seating from 150 to 200 persons, together with consulting-rooms, lavatories, &c. In the centre of the front part of the building is the secretary's room, and westward of that sitting-rooms and bedroom for the resident surgeon. Westward of these is the Board-room, about 29 ft. by 19 ft. 9½ in., corresponding in these dimensions to the shop below it and to the other shops. The second floor is devoted to two large public wards, each 40 ft. 9 in. long by 29 ft. wide by about 15 ft. high from floor to ceiling. These wards are placed one on either side of the main staircase, and between them, on the south side of the building, is the nurses' room. At the end of each ward are, on the north side, two water-closets and a slop-sink, and on the south side a bath and lavatory. Through ventilation will be obtained for these by means of windows in the north and south walls of the building. Each of these wards will contain twelve beds,—six on each side,—so that the two wards will provide for twenty-four beds. In the centre of each ward will be one of Boyd's hygiastic warm-air ventilating stoves,—the same maker's hygiastic grates being used throughout the building. The third floor comprises kitchen, scullery, stores and larder, bed-room and sitting-room for the matron, and three small wards for paying-patients,—one containing three beds, another two beds, and the third one bed,—so that the hospital will, in all, make up thirty beds for in-patients. These wards are, of course, provided with accessories in the shape of bath-

* To be continued.

rooms, lavatories, and water-closets. The attic floor is appropriated to bed-rooms for the nurses and female servants of the establishment. The central staircase is very light and airy, and in the centre of it will be a patients' lift. This and two other lifts are to be supplied by Messrs. Archibald Smith & Stevens, of Leicester-square. The ventilation is to be effected by the windows and stoves for the admission of air, and by means of extraction-shafts leading from the ceiling of each room and ward into a large main trunk, 5 ft. square, running east and west in the roof, and discharging its contents into the louvred cupola which forms the highest and most central feature of the building, and in which will be a gas rarefier or burner. The building is a lofty one, and is designed in the Queen Anne manner. Corbelled out over the central entrance is a Portland stone mullioned bay, extending upwards through the first and second floors. The centre above this is emphasised by a gable, behind which rises the cupola before mentioned. At each end of the main frontage is a projecting turret, giving emphasis to the extremities of the façade. Between these turrets and the central gable are dormer windows, lighting the bedrooms in the attic floor. The roof, which is of high pitch, is covered with Broseley tiles. The façade is in red Woolpit bricks, relieved with pilasters and panels carved in red bricks supplied by Mr. Thomas Lawrence, of Bracknell. The entrance doorways, the piers between the shops, and the cornice running over the shops at first-floor level, are in Portland stone. The eaves cornice is in Mr. Lascelles's concrete, painted white. The floors throughout are constructed of iron and concrete by Messrs. Homann & Rogers. There are three distinct supplies of water,—one for the baths, water-closets, and slop-sinks; one for culinary use; and one for drinking purposes,—in addition to a separate supply for the hot-water apparatus to be fixed by Mr. Boyd. The gasfitting is in the hands of Messrs. Buckley & Beach, of Chelsea. The frontage towards the churchyard is, unfortunately, very plain in character. A red brick front was at first intended, but was cut out, to save expense. The floors of the wards and rooms are to be covered with pitch-pine, polished, laid with boards 3 in. wide.

The general contractors are Messrs. Mark Patrick & Son, their general foreman in charge of the works from the commencement being Mr. W. H. Barnes. Mr. G. Chinnock is the clerk of the works.

NOTTINGHAM SCHOOL OF ART.

THE annual distribution of prizes in connexion with this successful institution took place a few days ago.

Mr. George Augustus Sala was among the speakers, and in the course of some acute remarks he said he had recently returned from Paris, and when he went to Paris he generally went to a certain hotel on the upper boulevards, because he was next-door neighbour to one of the most famous artists in bronze in Europe,—Barbedienne's, in the Rue de la Poissonnière, where there was a shop filled from end to end with the wonders of the bronzeworker's art. They knew what art bronzes were,—how magnificently they were finished, how excellent was the modelling, how capital the chiselling; but, looking at all the achievements which had gained for Barbedienne his world-wide fame, he could not but regard them with some feelings of sorrow and humiliation that works so splendid were not produced on any considerable scale in this country. They knew what the Messrs. Elkington had done in Birmingham; they had produced magnificent bronzes, enamels, and works in *repoussé*; but he had been told by them that in the long run it was the spoons and the forks and the dessert-knives that had to pay for them; and that few and far between were the works of art bronzes of which they were able to dispose, owing to the competition of the foreigners. But they must not grumble at that, so long as they modelled better than the English; for the magnificent shields, and candelabra, and statuettes which they produced showed how much better was the modelling of the foreigner, who had in general a facile hand, especially in works of bronze, where the foundation was modelling; and by this knowledge the foreign workman was enabled to go from the largest achievements of art to a child's toy, because he had to model in wax and clay when he was young. He knew modelling formed part of the training in that school, but when the young student commenced, as soon as they could see whether the pictorial or graphic faculty was predominant, if the faculty was for modelling, he should be trained carefully in that direction, not with the view of making him a great sculptor, but a great art-workman. And that led him to another branch of his subject, and in briefly dismissing it he hoped he would tread on no corns, on no toes, and wound no susceptibilities. He took it for granted he was addressing an earnest, capable body of students of both sexes, determined to excel, full of passion for hard work; and among them there might be many who had achieved excellence in design,—had produced exquisite designs for lace, and copied noble studies of the antique in chalk, and had now developed in them a faculty for doing work which they thought much better. The eye for colour has been opened, and the artist's faculty for drawing begun to be exercised in pictures, or perhaps a portrait of a beloved relative, a landscape, or some historic subject. The student then folded his arms, saying, "I am a painter; I will go up to London, or send up my picture to the Royal Academy, or the Society of British Artists." His advice to those was: "My young friends, do nothing of the kind for the present. If you are destined to be great painters, the faculty will one day assert itself; but for the present stick to design, be it drawing designs for wall-papers or lace curtains." They must remember they had a duty to themselves, to the grand old city of Nottingham, to the great employers of labour in it, and finally they had a duty to their country. He was a man of peace; he had seen too much of war in its most active and revolting forms not to loathe and hate it, and feel sick and grieved at the very name of war; he did not want to cut the throat of the foreigner, but also he did not want the foreigners commercially to cut the throat of his countrymen.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

THE general meeting of this society was held at the Society's Rooms, 7, Westminster Chambers, Victoria-street, on the 4th instant, Mr. A. T. Walmisley, president, in the chair, when the annual report of the council was presented.

It was stated that the society was established in 1859, and has since been doing good service among the junior members of the profession, many of whom were connected with the Institution of Civil Engineers, and who found the Civil and Mechanical Engineers' Society gave them opportunity of reading papers and taking part in discussions which would give them confidence, and so enable them to prove the more useful members of the senior body. In addition to this the society was useful as a social society, and as affording opportunity for all its members to become well acquainted, and to visit various works in progress during the summer months of the session.

The following gentlemen were elected officers for the ensuing session, viz.:—

President.—Mr. R. Harkness Twigg, M.I.C.E.
Vice-Presidents.—Messrs. H. Sandall and Thomas Cole, M.I.C.E.
Council.—Messrs. E. H. G. Brewster, Jno. Coates, A.M.I.C.E., F.G.S.; W. E. W. Crane; H. G. English; H. Howard, A.M.I.C.E.; R. E. Middleton, A.M.I.C.E.; H. T. Munday, A.M.I.C.E.; H. M. Whitley, A.M.I.C.E., F.G.S.
Auditors.—Messrs. G. C. Child and W. H. Milnes.
Hon. Solicitor.—R. H. Willcocks, LL.B.
Hon. Treasurer.—Wm. C. Street, A.R.I.B.A.
Hon. Secretary.—G. A. Pryce Curson.

THE AGRICULTURAL HALL COMPETITION.

IN the competition for the proposed additions to the Agricultural Hall, Islington, the designs sent in by Messrs Verity & Hunt, of Regent-street, and marked "Q. E. D.," have been awarded the first place by Mr. H. Currey, the appointed assessor; and these gentlemen have accordingly been called in by the committee to carry out the works. The following is an extract from Mr. Currey's report:—

"The plans of each competitor have been carefully studied, and I have felt some difficulty in determining which is the best; but, after a careful examination of details, the design marked 'Q. E. D.' commends itself to my judgment as deserving the first position."

THE TOTAL DESTRUCTION OF THE BERLIN HYGIENIC EXHIBITION.

IT was only on Friday in last week that we announced in these columns that on Tuesday, the 16th inst., the large and important Exhibition of Hygienic Appliances at Berlin was to be opened by the Crown Prince of Germany. Before the day on which we made the announcement had closed, however, the entire building, together with all its varied and valuable contents, had been reduced to ashes. It was only a few weeks ago that we described the total destruction of an exhibition by fire at Porto Alègre in Brazil. That was after the exhibition had closed, and arose from the wanton Vandalism of a drunken mob. In the case of the Berlin Exhibition, on the other hand, the destruction has taken place only a day or two before the date fixed for the opening. The cause of the calamity in the German capital appears pretty clear. The material employed in the structure itself consisted mainly of old timber, which had to a large extent been covered with tar and oil paint. Owing to the dryness of the season, the wood was in a very inflammable condition. The fire arose in the refreshment department, and spread with extraordinary rapidity. It broke out a little after seven in the evening, and before eight o'clock the entire edifice and all its valuable exhibits were reduced to ashes. A little more than half an hour sufficed to make the work of destruction complete, and it was with difficulty that the flames could be kept from extending to the neighbouring railway station and other adjacent buildings. In fact, several railway carriages were destroyed by the fire, and other damage was done beyond the area of the Exhibition itself. The losses sustained are very large. The insurances effected amount to upwards of two million marks (100,000*l.*), but this by no means covers the damage, which is believed to be double that amount. Moreover, the fire has consumed a host of exhibits which can never be replaced, and whose value is far from being represented by the sum for which they may have been assured. There were not many English exhibitors, but they have all lost whatever articles they had sent to Berlin, and it is believed that none of them had taken the precaution to insure their property.

WALTHAMSTOW HALL, SEVENOAKS.

THIS educational home for the daughters of missionaries of all denominations, now completed and fitted for the reception of 100 children, was opened by Mr. Samuel Morley, M.P., on Wednesday, the 17th inst.

The institution has hitherto been located in a house at Walthamstow, which, after considerable enlargement, was still found insufficient for the increasing numbers, and it was ultimately determined to erect a new building. A freehold site was purchased at Sevenoaks, consisting of about three acres. The architect of Milton Mount College, Gravesend, Mr. E. C. Robins, F.S.A., was chosen, and the present quadrangular building was erected in stages as money came in.

The building is situated in Holly Bush Lane, between the Vine Hall estate and Knole Park, on the brow of the hill overlooking the latter. It is built in the prevalent old English style, with red brick and ornamental tile facings, and tile roof-covering, the entrance doorway being of red Mansfield stone, and a many-latticed bay window rises above it two stories in height with a quaint gable roof.

It is a picturesque group of buildings, and depends for its effect upon its size and effectiveness of outline rather than upon expensive ornamentation of any kind.

The grounds are laid out for lawns, gravel walks, and playgrounds, and for kitchen gardens, and are entered by ornamental gates, presented by Mr. E. Pye-Smith, of St. Pancras Iron Foundry. The lodge is not yet erected.

The dining-hall is opposite the entrance-hall in the centre of the quadrangle, and has an open-timbered and panelled pitch-pine roof. The rest of the open quadrangle is occupied by the lavatories and cloak-rooms, carefully fitted up and heated with warm-water pipes, with which the dining-hall and all the corridors are warmed, open fires being provided for the rooms generally.

The kitchen block incloses the north side of the quadrangle, and is of two stories, and has servants' dormitories on the first floor. The lofty kitchen in the centre occupies two stories. Adjoining which are the scullery larder, pantry,

bread and other stores, the housekeeper's room and store-room, and the cooking school.

The first contract for the foundations and drains was taken by Messrs. Punnett & Co., and cost 1,400*l*. The next contract for the carcass of the main building and dining-hall was taken by Messrs. Willicombe & Oakley, and cost 6,300*l*.

The same firm completed the whole building, and laid out the grounds and fenced in the land, at a cost of about 10,000*l*., included in which sum are the following fittings which were executed by other tradesmen:—The heating apparatus, stoves, ranges, and ventilators by Mr. Boyd; the school fittings by Mr. Hammer; the gasfittings by Messrs. Richardson & Ellson; the blinds by Mr. Adkins; the joiner's fittings in cupboards and linen closet, fittings and tables, and cubicle furniture, as drawers and wash-stands, &c., by Mr. Ansell; the stained glass by Messrs. Pepper; the wood-block floors by Mr. Gregory; the tile pavements by Mr. Simpson; the fire hydrants by the local water company; the lightning conductors by Messrs. Cutting, &c.

Mr. Jabez Bignell has acted as clerk of works throughout.

THE EDINBURGH ARCHITECTURAL ASSOCIATION.

THE members of this Society, to the number of about thirty, headed by their president, Mr. John M'Lachlan, visited Hailes Quarry on Saturday, the 13th. At Kingsknowe Station they were met by Mr. Young, manager for Sir William Carmichael, who conducted them over the quarry. A fine view of the gigantic hole, the work of about 300 years, was got as the company passed round the top previous to descending. Hailes' quarry has been noted since it was opened for producing foundation stones of great strength, as well as superior steps and plats. Specimens of his finest rock were shown by Mr. Young, including a stone about 30 ft. long, 15 ft. broad, and about 18 in. thick, with beds as smooth and level as if they had been dressed by hand. The place was pointed out in the quarry where a large mass of liver rock—as distinguished from the stratified rock of the rest of the quarry—had been got. From this mass was built the front of Coates Crescent, forty or fifty years ago. The tail of the mass is still visible, looking very different from the serrated stone around. The company then proceeded under the picturesque natural arch which carries the Union Canal, and, after inspecting the eastern portion of the quarry, were entertained by Mr. Young to a collation of cake and wine. A cordial vote of thanks, accorded to Mr. Young, on the motion of the President, brought to a close a visit both enjoyable and instructive.

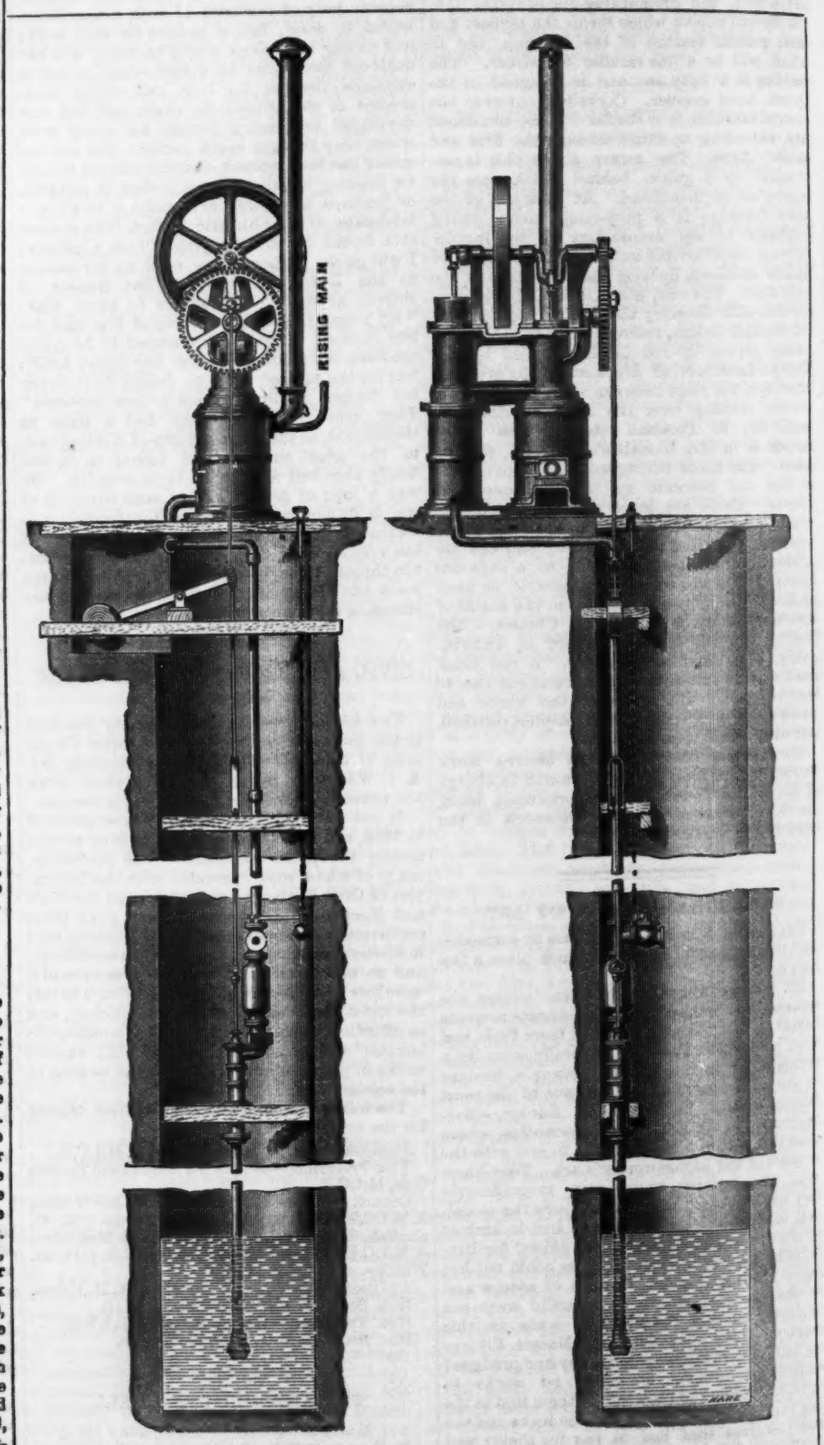
THE "SIMPLE" SCREW-DOWN COCK.

THERE was room for an improvement on the ordinary screw-down cock, and this seems to have been effected in the one advertised in our pages under the above title. It is the invention of Messrs. Ashton & Sperryn, and well merits the name of "Simple." It consists only of three main parts,—the barrel, the valve, and the cap. The valve-spindle is free to work within the barrel, being raised by the pressure of the water as the cap is unscrewed and closed by the screwing down of the cap. The only difference between the hot and cold water cocks is the material of which the valve or bucket is made. For the former, vulcanised indiarubber is used, whilst for the latter the ordinary cup leather answers the purpose. In comparing this cock with the ordinary screw-down stuffing-box cocks, it will be seen that it has fewer parts. The stuffing-box is entirely done away with, the action being dependent upon the water which raises the spindle, and is shut off by the spindle being pressed upon its seat. The cap is screwed on the outside of the barrel with a coarse thread, which gives a quick action, a set screw preventing the cap being raised too high. A very small quantity of water will raise the spindle, and as the pressure is increased the bucket is correspondingly expanded by the water inside it, and, no matter how great the pressure, the cock is found to remain sound; in fact, the greater the pressure the more perfect and striking is the success of this cock. The screw, being out of the water, is not liable to corrode; and no dirt can enter the working parts. The manufacturers are Messrs. John Russell & Co., of 145, Queen Victoria-street, London, Walsall, Birmingham, and Wednesbury.

DOMESTIC WATER SUPPLY.

Two years ago, in calling our readers' attention to the subject of domestic water-supply, we described the simple little hot-air engine of Mr. A. K. Rider, of Waldon, U.S.A., which is said to be capable of raising 1,000 gallons of water to a height of 80 ft. for the sum of 1d.

Messrs. Hayward Tyler & Co., hydraulic engineers (who are the sole makers of this little machine), have lately further improved its adaptation to deep-well pumps. The accompanying illustration shows the mode of working. It will be seen that on the main shaft a pinion is fixed, gearing (4 to 1) into a wheel carried on a long stud. On the wheel is a crank-pin carrying a connecting-rod, which acts directly on the pump-rod. By thus reducing the speed to one-fourth, a single-acting lift-pump can be employed, instead of, as hitherto, the more expensive plan of driving a set of two or three throw pumps.



Since our former notice, a great many installations of the Rider household pumping-engine have been made, and we are informed that many of the engines set to work five years ago have scarcely cost a shilling in repairs. The want of a cheap, efficient, and perfectly safe motive power, which can be put into the hands of an ordinary gardener or his assistant, has been greatly felt for many years. The number of these engines now in use all over the country seems to show that Mr. A. K. Rider has provided what was needed. One of these engines has been in operation for the last four years at the office of Mr. Okes, C.E., 39, Queen Victoria-street, where it may be seen doing actual work, any day (excepting Saturday).

The cheapening of the deep-well pumping apparatus is a step in the right direction, while the reputation of the makers is a sufficient guarantee of success.

BUILDING PATENTS.*

APPLICATIONS FOR LETTERS PATENT.

2,116. A. W. Kershaw, Lancaster. Ventilators. May 5, 1882.

2,120. W. McGill, Lambeth. Urinals. May 5, 1882.

2,121. T. W. Helliwell, Brighouse. Water-closet basins, &c. May 5, 1882.

2,150. A. Sweet, London. Self-closing valves for closets, &c. May 6, 1882.

2,157. J. M. Gray, Kingston-upon-Hull. Composition for cleaning and whiting stone stairs, hearthstones, &c. May 8, 1882.

2,179. A. Foster, Watford. Apparatus for cleaning windows. May 9, 1882.

2,216. T. C. Summers, Portsea. Supply of water to water-closets, &c. May 11, 1882.

NOTICES TO PROCEED

have been given by the following applicants on the dates named.

May 9, 1882.

33. S. L. Hunt, London. Street-cleaning and sweeping apparatus. Jan. 3, 1882.

42. E. G. Lakeman, Modbury. Stoves and furnaces. Jan. 4, 1882.

76. J. H. Johnson, London. Domestic fireplaces or stoves. (Com. by M. Perret, Paris.) Jan. 6, 1882.

77. H. Reid, London. Machinery for moulding, &c., cement for paving, building, &c. Jan. 6, 1882.

May 12, 1882.

1,620. P. M. Justice, London. Plaster for coating of walls, &c. (Com. by M. B. Church, Grand Rapids, U.S.A.) April 4, 1882.

ABRIDGMENTS OF SPECIFICATIONS

Published during the Week ending May 13, 1882.

3,778. W. Leggott, Bradford. Actuating and opening window sashes.

A toothed rack is secured on each side of both of the sashes. These slide in guides secured to the pulley-stile. At the bottom of each rack is a socket for the sash-lifting bar, which is secured to the bottom stile of the sash. Gearing is fitted to the racks, and the sashes may be raised or lowered as required, and by releasing the top of the sash from the rack the outside can be turned into the room. Aug. 30, 1881. Price 6d.

4,188. G. Hatton, Southport. Outside Spanish sun-blinds.

The blind is secured at the top to a roller actuated by one cord, and the bottom of the blind is secured to a falling frame, which forms the bonnet. The blind passes between rollers, and then projects out to this falling frame, to which wings are provided. The roller and the falling frame travel in slides. Sept. 29, 1881. Price 6d.

4,191. G. J. Cox, Maidstone. Gas cooking and heating stoves.

This is an improvement on Patent No. 2,636 of 1881 in various points of detail, which are described in thirteen pages of specifications, stated in nine claims, and shown in forty figures in the drawings, but which are not capable of being condensed. Sept. 29, 1881. Price 8d.

4,300. F. des Vœux, London. Manufacture of pipes for conveying water, gas, &c.

These are made of smooth sheet metal rolled into volute or cylindrical form, and layers of asphalte or cement, &c., are placed inside, and, if necessary, outside of the metal also. (Com. by M. Marx, New York, U.S.A.). Oct. 4, 1881. Price 6d.

4,367. S. E. Simpson, Birmingham. Dwelling-houses, &c.

These houses are placed back to back. (Protection not allowed.) Oct. 7, 1881. Price 2d.

4,376. J. Carter, Uxbridge. Constructing and glazing roofs, &c.

The purlins are attached to the principals by thumb screws. The panes of glass are arranged in rows, and the upper edges enter a groove in the side of the purlin, while the lower edges rest on the top of the next purlin, where they are secured by screw-hooks. Under the lower edges is a channel to receive the inside condensation. (*Pro. Pro.*) Oct. 8, 1881. Price 2d.

4,393. C. Shields, Manchester. Construction of safety-valves for domestic boilers, &c.

The casing is of globular form, and inside is a copper ball, provided at its upper side with a small valve and piston working against a seating in the lower side of a spring piston which is placed in a neck on the top of the casing. When the water falls below the level of the safety-valve the ball falls and opens the small valve for the escape of air or steam, and when the water rises too high the ball will raise the spring piston and allow the water to escape. Oct. 10, 1881. Price 6d.

Artists' General Benevolent Institution.—The sixty-seventh annual dinner of this Institution was held at Willis's Rooms on Saturday last, Professor Huxley, F.R.S., in the chair. Subscriptions to the large amount of 3,342*l.* were announced.

* Compiled by Hart & Co., Patent Agents, 28, New Bridge-street, E.C.

CASES UNDER THE EMPLOYERS' LIABILITY ACT.

GRIFFITHS *v.* THE EARL OF DUDLEY.

A VERY important decision was given on Tuesday last in an action in which the widow of an undersinker named Griffiths sued the Earl of Dudley for 150*l.*, the estimated amount of three years' earnings by her husband.

Shortly stated the circumstances of the case are these:—The deceased was at work, with a master-sinker named Gould, in making "manholes," or places of refuge, in the pumping-shaft of Lord Dudley's No. 2 pits, Himley Colliery, on the 19th of November last. They had fired a shot for the purpose of an excavation and had given the signal to ascend to the pit bank, when, at the critical moment, the indicator of the engine failed to act, and the men were drawn up close to the pulley, but not over it. Gould, the head sinker, clung to the pit frame and was saved; the deceased, in an effort for life, tried to jump from the "bowk" to the pit's bank, in essaying which he fell down the shaft and was killed. The case came before Sir Rupert Kettle, at the Dudley County Court, on March 24th last, when it was urged on the part of Lord Dudley that the deceased had accepted the "conditions of employment" in force at his lordship's collieries, and had thus contracted himself out of the Act.

Sir Rupert Kettle, who reserved his decision at the time in view of the importance of the case, now delivered judgment. He awarded the widow the full amount claimed, as he held (according to the summary of the case published in the *Times*) that no man has a right or legal power to bind his representatives by contracting himself out of the Act. The learned judge agreed to stay execution, pending a probable appeal to a higher court.

HEAVEN *v.* PENDER.

ANOTHER important action was tried at the Bow County-court, on Friday, May 12. The plaintiff, F. A. Heaven, sought to recover from the defendant, Mr. Pender, of the West India Docks, the sum of 100*l.* as compensation for injury sustained by him while engaged on the defendant's premises.

It appeared from the evidence that a Mr. Gray undertook to paint the steamship *Benalder* for Messrs. Thompson, of Leith, and the defendant Pender contracted to construct the scaffolding necessary for painting the outside of the vessel. On April 8, 1881, the plaintiff was engaged by Gray in painting the ship, when suddenly a rope supporting the scaffold broke, the scaffolding gave way, and the plaintiff fell a distance of from 17 ft. to 20 ft., and sustained injuries to his arm, leg, and side. He was under medical treatment at the hospital for four weeks, during which time he was unable to work. After this time, however, he was able to resume his duties, but experienced pains in his back while doing heavy work. It was contended on behalf of the plaintiff that the scaffolding was improperly constructed, and was not capable of supporting the workmen employed in painting the ship; also that the scaffolding should have been so constructed as to be capable of supporting not only the workmen but the public passing to and fro as necessity required.

On the other hand it was contended that the scaffolding was not improperly constructed; that the ropes were examined prior to their being used, and that no defect whatever was found in them; also that the accident must have occurred through the rope being injured in some way after it was put into use. It was further contended that the plaintiff was employed by Gray, and not by the defendant; also that the defendant was not bound by his contract to erect scaffolding capable of supporting the public, but only the workmen employed upon the ship.

The Judge, however, decided in favour of the plaintiff; damages, 20*l.* and costs.

Notice of appeal was given.

Mr. Scott appeared for the plaintiff, and Mr. Dickens for the defendant.

BAD DRAINAGE: LIABILITIES OF HOUSE-OWNERS.

NEVILL *v.* SMITH.

THIS case was decided in the City of London Court last week by Mr. Commissioner Kerr. The case had been before the Court some weeks previously, the action being to recover 50*l.* damages for loss and injury sustained through the alleged defective state of the drainage of a dwelling-house.

The question at issue was whether a landlord was bound by the representation of his agent. Mr. Float, the agent, was examined by Mr. Wetherfield, on the part of the plaintiff, and stated that he always let defendant's houses and received the rents. He remembered having a conversation with the plaintiff before the agreement for the house in question was signed. He did not remember whether anything was said by him as to the sanitary condition of the house, but if the question had been asked he certainly must have replied that it was thoroughly well drained and in a perfect sanitary state.

His Honour.—You say if you had been asked whether the house was well drained and in a perfect sanitary condition you would have said it was; but had you the smallest authority for that?

Witness.—Well, I knew more about the house than Mr. Smith did.

His Honour.—Did he leave the letting entirely to you?

Witness.—Entirely.

The plaintiff was called, and stated that he was a clerk in the City. He was very particular about the drains, because he had young children, and it was Mr. Float's representations which induced him to take the house. He was distinctly told that the drains had been thoroughly overhauled and the joints looked to, and that they were all in perfect sanitary order. Not long after he entered into occupation of the house, however, serious illness broke out in his family, which was attributable solely to the state of the drainage, and hence the present proceedings.

Mr. W. Beresford Smith, the defendant, deposed that he carried on business in Lombard-street, Gracechurch-street. He did not give Mr. Float any authority to make any representation as to the house.

His Honour, after a legal argument, said he was bound to find on the evidence—first, that inquiries as to the sanitary condition of the dwelling were made by the plaintiff; secondly, that Mr. Float had authority from the defendant, because it would be a mockery to say that a man should have everything to do with the letting of a house without seeing whether it was healthy or unhealthy; and, thirdly, that the plaintiff relied upon such representations as were made by Mr. Float. On the point of law, therefore, he was in favour of the plaintiff's case; but as to whether the house was in a sanitary state or not, that was a question for experts, and he referred it to the arbitration of Dr. Murphy, medical officer for St. Pancras. That gentleman accordingly examined a number of witnesses in the Judge's private room, and after fully considering the evidence, and examining the premises, he has come to the conclusion that the drainage was defective, and that the illness in the plaintiff's family arose from sewer poisoning.

Judgment has accordingly been entered by arrangement for the plaintiff,—damages, 35*l.*

MASTERS AND MEN.

Oldham Painters.—On the 12th inst. a meeting of operative painters was held at Oldham on the subject of an advance of ½d. per hour in their wages. They hold that the employers agreed last year at the close of the strike to give ½d. advance, which has been conceded in Ashton. The fact of the advance not being given by the Manchester employers has been taken by the Oldham employers as a reason why it should not be granted.

Festiniog Slate Trade.—Matters in the Festiniog slate-quarrying district continue unsettled, owing to the committee having so far failed to come to any arrangement with the employers as to the movement for shorter hours of labour. The committee intend laying the question before the annual conference of the North Wales Quarrymen's Union, which will shortly be held at Carnarvon. Generally the trade keeps brisk, although there are complaints of accumulation of stocks at some quarries.

DUTCH HOUSE BUILDING.

ALLOW me to correct a statement in your issue of May 6th, quoted from the *Gardener's Magazine*.

1. The land is *not* sand, *i.e.*, in the parts to which that article refers, but rich alluvial mud. The only *very* small strip of sand in Amsterdam is that on which the so-called "Old Church" is built, which stands in close contiguity to the "Bible" Hotel.

2. The King's Palace is not built upon 70,000 piles, but upon 13,659 piles.

3. It is not built of marble, but of Bentheim freestone, except the bottom part, which is of brick.

4. Some of the houses, especially those leaning over towards the street, are purposely so built, the principal reason for which appears to have been that the window-glass should be less easily dirtied by the falling rain.

5. The *principal* pumping stations are worked by steam power. The secondary canals and ditches are drained by windmills.

With these few corrections the article leaves nothing to be desired, though perhaps we might query the statement so boldly made that the people enjoy good health. F. B. SIMONS.

EDINBURGH.

SIR,—In your number of May 13th, in your notes from Edinburgh, you mention dry rot having occurred in the timbers of the Royal Infirmary. May we ask you to also call attention to the fact of the lifts originally put up never having worked at all, and that our estimate has been accepted for taking down the old lifts, and erecting high-pressure, direct-acting ram-lifts, without weights or chains? We are well on with the work, and shall have them all completed by the end of next November. The amount of our tender was between 3,000*l.* and 4,000*l.*; boring extra. We may state that this kind of lift is a new patent (Stevens and Major's patent), and that we are the sole manufacturers of it. It has the distinct advantages of having no chains to break, nor any pulleys or gearing overhead, and is practically absolutely safe.

May we also ask you to give us credit for supplying and putting up all the lifts at the Edinburgh New University Buildings, and to state that all the windows are fitted with our patent weathertight "Janus" casement-fastenings and sill-bars?

ARCHD. SMITH & STEVENS.

THE RECENT VIOLENT STORM.

SIR,—May I ask you to mention a curious circumstance which came under my notice soon after the tremendous storm which took place on Saturday, the 29th of April last? On the glass of some of the windows of the house in which I reside, I perceived a very singular appearance, somewhat resembling a deposit from milk. On looking at it through a microscope, I discovered a number of very beautiful crystals, which, without doubt, were caused by the spray from the sea, as, on applying it to the tongue, there was a strong taste of salt. The distance the spray must have been carried on this occasion could not have been less than sixty miles, taking into consideration the course of the wind, which was south-west.

NATHANIEL WATERALL.

Waddon, Surrey.

VOLUNTARY *v.* COMPULSORY SANITARY INSPECTION.

AT a meeting recently held in Glasgow to promote the establishment of a householders' sanitary protection association, Mr. John Honeyman, architect, in supporting a resolution, said he thought he might venture to say on behalf of his professional brethren, as well as on his own behalf, that they did not regard the formation of such associations with jealous or unfriendly feelings, but rather as powerful auxiliaries in promoting much-needed sanitary reforms. For his own part, knowing practically the difficulties which often lie in the way of proper arrangements being devised for house drainage, and the dangers which arise from bad workmanship and from accidental causes before and after a house was occupied, he thought it was simply impossible to overestimate the importance of periodical inspection. He was quite certain that if every householder in Glasgow knew as well as he did how impossible it was to rely upon the sanitary arrangements of a house being faultless at first, or continuing to be so, the prospectus of the proposed association would not be many days published till its membership would be reckoned by thousands. A hope had been expressed that the operations of such associations would lead up to the establishment of compulsory inspection by Government or local authorities; but he sincerely hoped that they would have no such result, and that they would rather do away with any excuse for such official interference. He was a believer in a doctrine which seemed to be getting rather out of favour of late, that the worst thing you could do for a man—the surest way to debase him, and to make him worse in every respect—is to do for him what he is perfectly able to do for himself, especially when it is clearly his duty to do it. Surely it would be infinitely better to aim at arousing an intelligent interest in such a subject as this, so much affecting one's own well-being and that of those nearest and dearest to him, and to stimulate to manly, independent action. Undoubtedly one of the most important results of the establishment of such associations would be their educative influence. This would very speedily be felt. Architects who might not have given the subject so much study as it deserved—and he feared there were such—would see the expediency of guarding against errors which the first visit of the inspector of the association would disclose. Contractors would certainly become more careful to avoid defective work, while householders would find themselves wonderfully enlightened after perusing the inspector's first report; and this increased knowledge would certainly produce most important results.

Books.

Joints made and used by Builders. A practical Treatise. By W. J. CHRISTY. Illustrated. London: Crosby Lockwood & Co. 1882.

MR. CHRISTY'S little treatise on joints forms one of Weale's Rudimentary and Scientific Series. The idea of the writer has been to bring together in a form capable of easy reference accounts of the various joints made by the artificers of certain specified trades. Those selected are (1) joints used in drainage, (2) bricklayers' joints, (3) masons' joints, (4) tilers' joints, (5) slaters' joints, (6) carpenters' joints, (7) smiths' joints, (8) joiners' joints, (9) plasterers' joints, (10) plumbers' joints, (11) zinc-workers' joints, (12) copper-smiths' joints, (13) glaziers' joints, (14) gasfitters' joints, (15) paperhangers' joints, (16) paviors' joints. In a work consisting almost exclusively of detail a reviewer will scarcely take upon himself to say that the subject has been either exhaustively or faultlessly treated, but as far as we have been able to trace the steps of Mr. Christy we think that he has fairly and distinctly brought before his readers intelligible accounts of the large number of joints that he describes. It is, perhaps, to be regretted that the inquiry has been limited to the term 'used by builders.' A little additional research would have gone far to make his book a comprehensive glossary of the various modes of joining materials now in common use. Thus we have distinctly enumerated the joints of the plumber, the zinc-worker, and the copper-smith. It would have been more comprehensive to arrange a section of joints made by workers in metal, and to treat of welding or autogenous joinings; soldering, or quasi-autogenous joinings; and joinings made by bolts or rivets. Again, we cannot but think that with reference to what, according to common parlance, is the typical joint, namely, the hinge, we ought to find something more than the short paragraph headed "Hinge Joint" among joiners' joints. "The whole subject," says Mr. Christy, "of hinging is so enticing and interesting that it will be expedient to pass on at once to the next joint." Here the author does scanty justice, either to himself or to his subject. On p. 173 he figures a "rule joint," which he calls "a hinged or movable joint given sometimes to window-shutters, but most commonly seen in tables, and other productions of the cabinet-maker." This avoidance of a most important branch of the subject leads to the remark that Mr. Christy has nowhere stated what he considers to be the true technical meaning of the word "joint." It has, no doubt, a double sense,—as implying either the actual point of junction of two substances, or the mode or principles of junction. And of the two, it is the latter which has the most significance, and the explanation of which is of most value to the pupil. "By a simple joint," we are told, "is meant one consisting of nothing beyond the contact of meeting surfaces,—such as an abutting joint in carpentry,—without fastenings of any kind." We demur to calling such an accident a joint at all. The idea of holding together, not that of mere juxtaposition, we take to be a necessary element of the meaning of the word. "By a compound joint is meant one in which a cementing medium, or some kind of attachment, is used to assist weight or pressure in keeping the contiguous parts from moving or rattling." We should like to see either literary or technical authority cited for the last sentence. As it stands, it excludes that large and most important category of connexions which allow of free play in a definite, or, as in the case of the "universal joint," "in any direction with certain restrictions as to extent." The explanation of a compound joint which excludes either the hinge or the universal joint is singularly unhappy. Nor does the reference on p. 4 to the haunch of venison at all tend to render more clear to the reader the true meaning of the little word "joint."

A treatise on the subject, then, should commence by defining the sense which the author attributes to the word used on his title-page, and should then lay down the principles which underlie the several species of joints. Thus, the reader would commence with the general but definite idea of what was required, and of the method by which it was sought, according to the nature of the different materials employed, to ensure the given end. These ends, moreover, would be of at least two sorts, according as it was desired to obtain a movable joint, or a substantial union of two materials. As to this, however, Mr. Christy tells us nothing. What he has produced thus far is rather a glossary than a treatise. As a glossary the work is deserving of high commendation. And it has the rare excellence of a full, not to say elaborate, index.

VARIORUM.

"THE Iron Duke, or the Monument Removed," by V. I. H. (Marcus Ward, Chandos-street), serves to show the opinion entertained out of doors respecting our municipal authorities. It is a good-humoured skit, and we reprint the close of it:—

"The deed was done. The Wellington Arch, much to its own surprise, had disappeared from the face of the earth, and the statue was no longer visible to the public eye. Grosvenor-place and Hyde Park-corner were considerably wider than heretofore, but as most of the traffic,—that is, all that survived the ordeal of the block by Hamilton-place,—chose to go down the new road to Halkin-street, the extra width was hardly required. The Board of Muddles, economically inclined, soon came to the conclusion that the cost of keeping the wood-pavement in repair was too enormous to be defrayed: so a large piece was taken from it and thrown into the triangular garden, which covered the space vacated by the arch. Here, however, arose a new difficulty. The cost of keeping up the garden being now greatly augmented, it was proposed to erect some centre monument to cover part of the cultivatable area.

'Bless me!' thought each individual member of the Board, but none had the temerity to say so, 'the old Arch would have done as well as anything else if we had left it standing.'

This, it may be remembered, had been the Arch's own opinion many years before.

'Suppose,' said one of the members, cautiously approaching the subject by setting forth a proposition somewhat akin to the one in his own and his colleagues' minds,—'suppose we put up Temple Bar?'

The idea recommending itself, application was made to the treasurer, who, unfortunately, quashed the movement by looking in the company's coffers and only finding a bad farthing, which, by the way, happened to be owing.

Let us now return to our friends the Arch-Duke and the Ducal-Arch, who were becoming very uncomfortable in their cramped position in a stone-mason's yard. He had kindly taken them in when no one else seemed to know what to do with them; but even he was getting tired of so hospitably entertaining such unremunerative guests, and daily and hourly he became more abusive and insolent. Frequently he might be overheard grumbling at the space they occupied. Alas! even their wretched standing-room was grudged them; and, had he not been too heavy to move without great expense, the Duke would undoubtedly have been packed at the top of the dismembered Arch to get him conveniently out of the way. What was to become of them?

Things were at this deadlock (everything was at a deadlock, not only the vehicles at the bottom of Hamilton-place), when a way out of the pecuniary difficulty providentially presented itself.

A gentleman, with a remarkably nasal twang, made a bid for the Arch.

His offer was received with indignation and contempt, and forthwith accepted. So he built a big ship, and sailed away with his latest trophy, several City dignitaries accompanying it on its first stage to see it safely off.

The Arch now occupies a somewhat subordinate position as a strong gateway for the abode of a certain magnificent animal (exact species now extinct, though some very small specimens of similar quadrupeds may still be seen in the Regent's Park), and, from a little distance, Cleopatra's American needle looks down contemptuously upon it.

Before leaving the Transatlantic resting-place of our second hero, we may add that it is proposed to finish the domestic group by buying and bringing over the Tower of London to match the obelisk.

The old Duke meanwhile,—nobody having bid for him,—was bandied about from pillar to post, and finally carted off to the Embankment, where, instead of the homely sparrow sitting on the bridge of his aquiline nose, the grimy street Arab sits on the saddle of his charger. He cannot even defend his faithful steed from the onslaughts of these marauders; much less can he, by his warlike appearance, awe,—as was confidently and economically expected by the police,—the banditti who make night hideous with their wholesale massacres on the banks of the Thames.

There he sits in stony grief, while from a little distance Cleopatra's English Needle looks down contemptuously upon him.

Let us draw a curtain over the harrowing picture. See, the walkers are unfurling their umbrellas, and

another passing shower may be expected, if we can judge by the look in the eyes of the old Iron Duke."

——"An Elementary Treatise on the Construction of Roofs of Wood and Iron," by E. Wyndham Tarn, M.A., architect, has been added to Weale's "Rudimentary Series" (Crosby Lockwood & Co.), and will be found valuable by all students. It is intended as an introduction to more elaborate treatises upon this important part of a building, but Mr. Wyndham Tarn is so thoroughly master of his subject that, although the treatise is founded on the works of others, he has given it a distinct value of its own.—— "William Hedley, the Inventor of Railway Locomotion on the present Principle" (Carr, Newcastle-on-Tyne) is an endeavour by Mr. Archer to obtain for Hedley the credit that has been denied him. The world will call George Stephenson the inventor of the locomotive, and the work done by Hedley, who first discovered the grand fact that the wheel of the engine upon the smooth line was sufficient to give the amount of propulsion to enable it to move and carry weights is always forgotten. It is right that Hedley's claims should be insisted on, so we commend Mr. Archer.

Miscellanea.

Statue to a former Lord Mayor of London.—The *Coventry Herald* has published a sketch of the marble statue which it is intended to erect on Grey Friars-green in that town as a memorial to Sir Thomas White, who, born at Reading in 1492, the son of a poor clothier, was apprenticed to a London merchant when only twelve years of age. In 1523 he embarked in business on his own account, his father having left him 100*l.* to begin the world with, and by thrift and industry he succeeded so well that he acquired a large fortune, whilst at the same time, and subsequently, he took great interest in the municipal government of the City of London. In 1546 he was elected sheriff, and became Lord Mayor in 1553. It was during his term of office that the insurrection under Sir Thomas Wyatt took place, and the effective measures which the Lord Mayor caused to be taken in suppressing it obtained for him the recognition of knighthood at the hands of Queen Mary. Although constantly occupied in the exercise either of business engagements or municipal affairs, he still found time for interesting himself largely in benevolent actions, and his powers were equal to his will. In 1542 he gave 1,000*l.* to the city of Coventry to purchase lands, which he appears to have shortly afterwards augmented by 400*l.* more, and this sum of 1,400*l.* he subsequently enlarged to 2,060*l.* The rents of this land were to be applied in the exercise of charity. In 1555 Sir Thomas White founded the College of St. John's, Oxford. Bristol, Northampton, Leicester, Nottingham, Warwick, Shrewsbury, Gloucester, and fifteen other places, have good cause to reverence his memory, and the town of Leicester has set an example by erecting a memorial clock-tower in its market-place at a cost of over 1,000*l.* Coventry, which obtained the lion's share of the benefactions, has hitherto erected no memorial. The statue about to be erected there is being executed by Messrs. W. & T. Wills.

Gas Exhibition at Newcastle-under-Lyme.—Under arrangements made by the Newcastle Corporation Gasworks Committee and their officials, an exhibition of improved appliances for the use of gas was opened last week in the Town-hall. The exhibition showed the progress which had been made of late in the utilisation of gas for other purposes than that of lighting, and though, from the limited space at disposal, it was not of an extensive character, the exhibition was most interesting, especially as it was the first of the kind held in the district. The committee were fortunate in securing the co-operation of a number of manufacturers of gas apparatus, and an appropriate introduction to the exhibits was shown in a neatly-made model of a gasworks, kindly lent by Mr. C. Hunt, of the Corporation Gasworks, Birmingham. From this exposition of the manufacturing department, the visitor passed on to a very striking display of the products which science has taught us may be derived from coal.

The Dorking Local Board, at their meeting on the 9th inst., appointed Messrs. Smith & Austin, of Hertford, consulting engineers to the Sanitary Authority, to carry out works of sewerage for their district.

Memorials of the Dead.—The inaugural meeting of the National Society for Preserving the Memorials of the Dead was held last week at the house of the Society of Arts, Adelphi. In the absence of the Earl of Carnarvon, Mr. S. Leighton, M.P., presided over the earlier portion of the meeting. The objects of the Society are to preserve and protect the memorials of the dead in the parish churches and churchyards: By securing a record of sepulchral memorials now existing being made, and a notification of the site of destroyed or removed monuments, where such can be identified; by a careful watching of work carried on in the churches and churchyards, especially during the period of "restoration" or rebuilding; by repairing and renewing any such memorials as the society may be advised, and, if necessary, under faculty; by granting funds for the purpose, where no branch of the family remains; by using every legitimate means to prevent the desecration of the churchyards; by promoting and procuring legislation; by promoting a publication (illustrated if possible) of the more important and historical examples, and by encouraging the printing and publishing of parochial registers; by forming a reference library of works treating upon the monumental and art sculpture of the country. Mr. A. E. Street, M.A. has consented to act as the honorary architect, and Mr. R. Davison as the honorary monumental conservator. The Bishop of Nottingham moved,—"That the memorials of the dead in our parish churches and churchyards, being a part of the records of our national life, are well deserving of being preserved from decay, destruction, and loss." Major Heales seconded the motion, which was carried. The Earl of Carnarvon, having subsequently arrived, took the chair, and warmly commended the society to the support of the meeting. His lordship mentioned many places in which tombstones and monumental brasses were being ruthlessly destroyed. In some villages gravestones had been used to pave cellars and cottages, and even with the permission of the clergymen themselves. He regarded churchyards with the greatest veneration, and showed how beautiful many of them were nowadays when contrasted with those which had been allowed to go into decay.

St. John's School Extension, Ealing Dean.—These new schools have been built and completed within a period of about five months by Mr. Dorey, contractor, of Brentford, from the designs of the architect, Mr. Robert Willey, Ludgate-hill. The additions are Gothic in character, to harmonise in certain respects with the existing school, and they are carried out in brickwork with stone dressings. The building is of two stories, accommodation being provided in the school and class-room on the first floor for 168 girls, and on the ground story is similar accommodation for 168 boys, the principal rooms being each 62 ft. long by 20 ft. wide. The infants are to retain the old school, which will accommodate 150. Special attention has been given to the heating and ventilating arrangements, Manchester grates having been adopted, and numerous and easily controlled air inlets and outlets having been provided in all the rooms. Bowes Scott and Read's automatic flushing tank has been adopted for the closets. The contract for the works was 1,150*l.*, which was exclusive of fittings and fences.

Forth Bridge Railway Bill.—This Bill has been passed by a Select Committee of the House of Commons, of which Colonel Stanley is chairman. The promoters of the Bill are the Great Northern, North-Eastern, Midland, and North British Railway Companies. The object of the Bill is to construct a bridge across the Forth at Queen's Ferry. The bridge is to be about one mile in length, and is to be on the girder principle. There are to be two main spans of 1,700 feet in length. The headway of the bridge will be 150 feet, which extends in each span for 500 feet. The Board of Trade require that the bridge shall bear a wind-pressure of 56 lb. to the foot, and a strain of one ton to the foot. The material to be used in the construction is steel, of which it was stated 43,000 tons are to be used. The cost of the bridge is to be 1,750,000*l.*, and the engineers are Messrs. Barlow, Fowler, & Harrison.

Hertford Sewage.—The Corporation of Hertford have agreed with the Rivers Purification Association, of 232, Gresham House, Old Broad-street, to continue the purification of the sewage of the town for a further period of five years at an increased subsidy.

New Altar, Mayfield.—The new altar in the Church of the Convent of the Sisters of the Holy Child Jesus at Mayfield is now nearly completed. The design of the altar (says the *Sussex Advertiser*) is by Mr. Pugin, jun. The sculptures were executed by Mr. Boulton, of Cheltenham; and the brasswork by Mr. Hardman, of Birmingham. The centrepiece consists of a burnished corona (suspended at present from a temporary crane) supported by two angels. From the corona descends, in effective folds, a veil in sculptured stone, sheltering a tabernacle of burnished brass placed just above the altar. On either side are sculptures, the one on the right representing St. Thomas of Canterbury in the act of refusing to sign the constitutions of Clarendon; the other, on the left, showing St. Dunstan drawing, with a pair of compasses in his hand, while a band of angels appear to him. At either corner stands a high sculptured figure; on the right, St. Joseph, holding the Child Jesus; on the left, the Virgin. Under the altar is an alto-rilievo sculpture, representing the Child Jesus lying in the crib at Bethlehem, with St. Joseph worshipping at one end and the Virgin at the other, some charming angel faces appearing in the background. The chapel, it may be known, occupies what used to be the banqueting-room of the archiepiscopal palace, and the altar stands where the archbishops' throne used to be. The building has been restored, as nearly as possible, according to its original design, Mr. Pugin objecting to the removal of the ivy-covered ruins, which he used as a beginning for his own modern work. The furnace adjoining the chapel is shortly to be removed. Other restorations are contemplated. Among other things, it has been decided to construct cloisters.

The International Colonial and General Export Trade Exhibition is to be held at Amsterdam next year, from May to October. The general regulations provide that the Exhibition shall contain (1) produce of the Colonies; (2) articles of general export; and (3) works of art and antiquity. It will provide opportunities for competitive exhibitions of living animals, flowers, fruits, &c.; and also for the holding of congresses and conferences. The prizes are to be awarded by an International Jury. The juries will be formed into sections corresponding to the groups and classes of the Exhibition. The rewards are to consist of (1) a diploma of honour, (2) a gold medal, (3) a silver medal, (4) a bronze medal, and (5) honourable mention. Every diploma and medal will be accompanied by an official medal in bronze. The articles exhibited will be arranged for each nation into nine groups for the two first divisions. Every group will be divided into classes, following the system of the general classification. There will be published, in the Dutch and French languages, an official catalogue, setting forth the productions of each nation and the name of each exhibitor. All communications, whether from exhibitors or other parties interested, should be addressed to Monsieur le Commissaire Général de l'Exposition de 1883 à Amsterdam.

Strawberry Hill in the Hands of the Philistines.—The thought is torture (says the *Richmond and Twickenham Times*), but the fact may be possible, judging from the story which has gone the round of the Press, without contradiction, that the house is being transferred to the Americans for hotel purposes. "It seems impossible to believe that those who have the power to sell should have so forgotten the chivalry of noble associations and the social glories of the last few years (hallowed by the shadow of death), that all should have been outweighed by the potent consideration of the base almighty dollar. Has it come to this, that great wealth and great taste are incompatible in the same person, and, given a house steeped in literary, artistic, and social memories of the most exquisite order, that when it comes into the market no Englishman of opulence and culture can be found ready to secure the noble honour of making such a glorious gem his own?"

Birmingham.—The opening of the restored Central Free Libraries has been fixed for Thursday, the 1st of June. The Right Hon. John Bright has acceded to the request of the committee to deliver an address on the occasion. In order that every subscriber to the Restoration Fund, as well as the members of the Council and its officers, and the representatives of the chief Educational Institutions of Birmingham, may have the opportunity of being present, it has been arranged that this address shall be delivered in the Town-hall.

Scandalous Workhouse "Accommodation."—At the meeting of the Guardians of the Holborn Union, on the 10th inst., a letter was read from the Local Government Board, transmitting for the consideration of the guardians an extract from a report made by Major Jordon, assistant inspector, after his inspection of the workhouse in Gray's Inn-road. The letter also referred for the second time to the report made by Mr. Hedley after visiting the workhouse on January 10th last, an extract from which was forwarded to the Board on the 24th of that month. In consequence of the serious state of things disclosed by these reports,—the absolute insufficiency of the accommodation at present at the disposal of the guardians for the relief of the indoor poor of the Union,—the Local Government Board urges the guardians to take remedial measures. The letter concludes as follows:—"The question is one of such primary importance that the Board must request that its consideration may no longer be deferred, and that they may be informed at an early date of the measures which guardians are prepared to take in the matter." The extract alluded to is as follows:—

"The men's day or oakum-picking room has to contain 220; it is ill-ventilated, a basement-room but 8 ft. in height, which allows only 8 cubic feet of space per man, consequently the atmosphere from want of air and light is almost intolerable. In the men's sleeping wards the beds are touching, and the centre space, which ought to be clear, is also occupied. The men's receiving ward is not worthy of the name, below ground, dark, and badly ventilated, and yet as many as forty admittances are passed through it in a day. The women's portion of the house is less crowded than the men's. From the cramped state of the premises there is but one yard for the female inmates, including insane. Except division of sexes, classification is impossible."

Mr. Chapman moved that the whole subject be referred to the consideration of the General Purposes Committee, which was agreed to.

London and Middlesex Archæological Society.—A special general meeting of this Society was held at Hammersmith Church, on the 6th inst., when its architectural features were described by Mr. Hugh Roumieu Gough. The members then proceeded to Chiswick Church, where the rector, the Rev. W. L. Dale, gave a short account of its history, and Mr. W. S. Kershaw, F.S.A. (one of the hon. secs.), read a paper on "Hogarth and London Topography." The company then inspected Hogarth House and Fairfax House. At the last monthly meeting of the Society for the present session, held on Monday evening last, a paper on "The Church of St. Alphage, London-wall," was read by Mr. G. B. Hall. Reference was made to the old St. Alphage Church, which stood at the corner of Cripplegate-buildings, its demolition, and the present church, then called the Chapel of St. Mary Elsyng Spittle, being erected. Allusion was also made to the bonfires and bell-ringing on certain holidays, the celebration of British victories, &c., to the Plague of London, the old Roman wall, and the litigation by which it was decided to belong to the inner parishes, whilst those outside could only claim the ditch. Mr. G. Lambert, F.S.A., followed with a short communication on "Sir Nicholas Crispe, buried in Hammersmith Church."

A Subway from the New Law Courts.—In the House of Commons, Mr. Mellor asked the First Commissioner of Works whether the original plans for the New Law Courts did not show a communication between the Temple and the Courts by means of a subway; whether his attention had been called to the great difficulty of crossing Fleet-street, owing to the amount of traffic opposite the Temple; and whether he was disposed to afford facilities to enable such a communication to be made. Mr. Shaw-Lefevre said he believed that such a proposal had been made, but that it was not entertained by the Government of that day. No doubt such a subway would prove a great convenience, and he would be quite prepared to entertain any proposal of the kind, if made by a responsible body, but he could not hold out any hope that the Government would incur the expense.

Inland Transport.—Great interest is being aroused in the manufacturing districts as to the re-opening of our canals, and a petition, drawn up with a view to render the committee moved for by Mr. Salt an efficient and impartial tribunal of investigation, has received numerous subscriptions at Manchester, at Wolverhampton, and from the Chairmen of the Chambers of Commerce throughout the country.

Proposed School of Dramatic Art.—On Monday last the Earl of Wharncliffe presided over a meeting which was held at the Lyceum Theatre for the purpose of hearing the details of the proposed School of Dramatic Art. The noble chairman, in opening the proceedings, regretted the absence of the Earl of Lytton, owing to the death of his mother. In the project they had in view the great object was to enlist as much as possible general support. The committee comprised the names of the principal actors of the London theatres, dramatic authors, and also critics. The proposed school would teach dancing, music, fencing, stage deportment, and elocution. Above all, the principal thing would be acting. They wanted the school to be self-supporting, and did not wish to come to the State for any aid, hoping that the fees from the pupils would amply repay them. They hoped to increase their funds by teaching elocution to young men who intended to devote themselves to the clerical and legal professions. Mr. Dion Boucicault moved a resolution to the effect that the meeting approved of the project of the School of Dramatic Art, and trusted that means might be taken to carry it into effect. Eventually it was hoped the school would meet with such success that it would receive a Government charter. Mr. Henry Neville seconded the resolution, which was carried.

Proceedings against a Music-Hall Proprietor.—At the Southwark Police Court, on Wednesday, Mr. Hart, the proprietor of the Raglan Music-hall, Union-street, Borough, appeared to answer an adjourned summons for neglecting to make the necessary alterations required by the Metropolitan Board of Works, under the provisions of the Act of 1878 relating to fires in theatres and music-halls, for the protection of the public. Mr. Besley (instructed by Mr. Burton) appeared for the Metropolitan Board of Works. Mr. Besley said the Act gave power to the Metropolitan Board of Works, with consent of the Secretary of State, to require of the owners to make such alterations as might be necessary for the safety of the public, within a reasonable time; in default, a penalty of 50*l*, and 5*l*. a day could be imposed. On July 11, 1881, the defendant was served with a notice specifying what alterations were required. He made certain alterations, but failed to make the most material alterations, such as making the doors to open outwards and making a free way from the hall at the rear of the stage. Mr. Hart said he would have the doors altered immediately, and would endeavour to make some arrangement with the other tenants of the premises at the rear of the stage to open a passage into Ewer-street. Mr. Slade, the magistrate, inflicted a nominal penalty of 10*s*., and 5*l*. 5*s*. costs.

Railway Projects.—The Select Committee of the House of Commons appointed to consider the South-Eastern Railway Bill (new lines and widenings), which proposes to widen the present line from Cannon-street to Charing-cross, and also to widen the Charing-cross railway-bridge and the Cannon-street railway-bridge, have concluded their sittings. Mr. Morgan Lloyd, the chairman, after consultation with the rest of the Committee, announced that they had decided to consider the preamble proved, subject to a limitation being inserted in the Bill that the Charing-cross-bridge should not be widened by more than 48 ft. Another select committee have passed a bill authorising an extension of the London, Tilbury, and Southend Railway, commencing at their terminus at Southend and terminating at Shoeburyness, a distance of nearly four miles. The same Bill also gives powers to the company to construct a railway 19¼ miles in length from Barking to Pitsea, in order to shorten the existing route between London and Southend.

Mr. James Bubb, the well-known Clerk of Works at Truro's new cathedral, passed peacefully away shortly after nine o'clock on Wednesday morning (May 17). He had been with Mr. Pearson a great number of years, and had had the practical carrying out of many of that eminent architect's best churches. Mr. Bubb was unmarried and in the prime of life. The funeral is arranged to take place on Saturday afternoon.

Architecture at the Mansion House.—The Right Honourable the Lord Mayor (Ellis) and the Lady Mayoress, at the Mansion House, entertained at dinner on Thursday evening last, too late for further notice in our present issue, representatives of the professions of architecture and surveying.

Passed Candidates in the First Obligatory Architectural Examination.—At the meeting of the Royal Institute of British Architects, on Monday evening last, the following gentlemen, having satisfactorily passed the Obligatory Examination, held in March last, were recommended for admission as Associates of the Institute, viz.:—Messrs. John William Simpson, Mitre-court-chambers, Temple; Arthur Sutton Govar, Queen-street, Cheapside; Francis Hooper, Hayne-road, Beckenham; Nathaniel James Stanger, Tressillian-crescent, St. John's, S.E.; Charles James Tait, Highbury Park; Charles Steward Smith, Friar-street, Reading; George Alexander Thomas Middleton, Bedford-hill, Balham; Thomas Bostock Whinney, Regent's Park-road; Samuel Cuthbert Rogers, Bedford-row; Percie Cowper, Frederick-street, Gray's-inn-road; Edwin William Poley, Lady Somerset-road, Highgate; and Robert William Bousfield, Clifton-gardens, Maida-vale, W. Five other candidates, making seventeen in all, passed the Examination, out of a total of twenty-two who entered.

The Corporation of London and the Polluted State of the Thames.—At the last meeting of the Court of Common Council, it was resolved, on the motion of Mr. E. G. Wood, "That it be referred to the Port of London Sanitary Committee to inquire into the increasingly polluted state of the river Thames, in consequence of the large quantity of sewage discharged from the outfalls at Barking and Crossness, with power to invite and take evidence, and to report fully to this court thereon, with such recommendations as they may deem expedient for carrying out so important and urgently-required an undertaking as the purifying of the river, and with authority to confer thereon with the Commissioners of Sewers and any other public body they may think desirable; and that it be referred to the Port of London Sanitary Committee, with power to confer with the Commissioners of Sewers as to the advisability of preparing a Bill for Parliament or otherwise for the prevention of such pollution, and reporting thereon to this court."

Will Sewage Farming Pay?—This question was answered in the affirmative by the chairman of the Sewage Committee of the Town Council of Wolverhampton at its quarterly meeting last week, who in analysing the annual balance-sheet of the Corporation Sewage Farm, claimed that, whilst farmers generally in the neighbourhood were absolutely losing money, the Corporation were able to say they had paid a liberal salary, had charged interest on capital, which very few farmers ever dreamt of charging, and had yet realised 34*s*. per acre by the Barnhurst Farm. This fact (says the *Staffordshire Advertiser*) is the more remarkable inasmuch as the Town Council is anything but an association of theoretical or practical agriculturists, and the main object of the farm is to consume the sewage of the town.

Mr. Richard Cull, F.S.A.—An effort is being made by the friends of Mr. Richard Cull, of Tavistock-street, Bedford-square, to raise a fund, partly in recognition of public service, but, specially, to create some provision for the wants of his declining years. We are sorry to hear this has become necessary in consequence of nearly two years' illness, whereby Mr. Cull has been incapacitated from pursuing his literary avocations, and of the entire wreck, through a disastrous investment, of the small fortune upon which he has hitherto been chiefly dependent for support. Mr. Cull was for six years hon. secretary to the Ethnological Society, and edited two volumes of its "Transactions," and he was part editor of "The Comprehensive Dictionary." The Rev. Canon Nisbet, treasurer of the fund, at No. 16, Bedford-square, will gladly receive subscriptions.

Hookham's Fasteners for Pictures.—Messrs. Tonks & Son, instead of thanking us for advertising their wares in a paragraph, write to suggest that we ought not to say these fasteners have not yet come into general use, because they have sold more than 800,000 pairs since the patent was taken out. How far would 800,000 pairs go if the fastener were really to come into general use?

Battersea.—We understand that Messrs. Satchwell, of 31, Cheapside, have sold by private treaty the freehold estate, consisting of ninety houses and shops, being the whole of Motley-street and Motley-place, Queen's-road, Battersea, producing a rental of 3,000*l*. per annum. Six or seven years ago the ground on which these houses stand was covered with cabbages.

The New Eddystone Lighthouse was dedicated to its beneficent work on Thursday last by H.R.H. the Duke of Edinburgh. The new lighthouse has been erected from the plans and under the supervision of Mr. Douglass, the engineer to the Trinity Board. The tower is built wholly of granite, obtained from the De Lank Quarries, near Bodmin, and the great expedition with which the work has been completed, much within the expected time, has been mainly due to the manner in which Messrs. Hugh Shearer & Co., the owners of the quarries, have carried out their part of the undertaking. The tower has, in fact, been constructed at De Lank, every stone having been finished there and marked for the place it was to occupy. The blocks of the lowest, or cylindrical portion, are each 6 ft. 6 in. deep, 2 ft. thick, and 3 ft. 10 in. on their outer circumference, and they are all without a flaw. Throughout the whole tower every stone is dovetailed, by projections and grooves, into those above, below, and on either side of it.

Competition: Royal Asylum of St. Anne's Society.—The committee seem to have taken pains that the competition invited by them in designs for new buildings at Redhill, Surrey, should be rightly conducted and have a satisfactory result. They have appointed Mr. Whichcord, F.S.A., as professional assessor, and that gentleman has assisted them in preparing the Conditions of Competition. The designs are to be sent in on the 21st of June, and it is proposed to employ as architect the author of one of the three selected designs, subject to his producing satisfactory evidence of his experience and capacity; but no competitor will be employed to carry out the work unless an actual tender be obtained from a responsible contractor at a price not more than 10 per cent. above his estimate.

The Birkenhead Competition. — The authorities decline to communicate officially the names of the four selected competitors. It is generally understood, however, that two hail from London and two from the provinces, and that the former are Mr. Gooch and Mr. Henry Hall.

Value of Property in the City.—Mr. F. Ellis Morris, of the Poultry, sold by auction, at the Mart, on Wednesday in last week, the freehold premises, No. 9, Cornhill. The property realised 25,050*l.*, or about 33*l.* per superficial foot, and 1,565*l.* 10*s.* per foot frontage.

TENDERS

For warehouse, Jewin-street, City. Messrs. Ford & Hesketh, architects. Quantities supplied:—

Higgs & Hill	£2,874 0 0
Perry & Co.	2,872 0 0
Hall, Beddall, & Co.	2,838 0 0
Peto Bros.	2,806 0 0
Lawrence	2,772 0 0
McLachlan & Sons	2,768 0 0
Conder	2,752 0 0
Simpson & Son	2,745 0 0
Brass	2,692 0 0
Ashby Bros.	2,678 0 0
Scrivener & Co.	2,637 0 0
Priestley & Co.	2,593 0 0

For pulling down and rebuilding the Britannia Tavern, Barking, for Mr. W. Evans. Mr. C. J. Dawson, architect:—

Reed, Stratford	£1,494 0 0
Mansfield, Stratford	1,392 0 0
Harbert Bros., Plaistow	1,367 10 0
Salt, Burdett-road, Bow	1,302 10 6
Hawkings, Mile-end	1,178 0 0
Wood & Sleep, Poplar	1,162 0 0
Argent, Barking	1,144 0 0
Atherton & Latta, Poplar (accepted)	1,140 0 0

For alterations, additions, and repairs to the Stag public-house, 29, Dorset-street, Baker-street. Mr. F. W. Hunt, architect. Quantities by Messrs. Vinall & Kennedy:—

Thon	£700 10 0
G. Shaw	675 0 0
T. Haylock	614 0 0
W. H. Butcher	568 0 0
E. Harris & Sons	563 0 0
J. & H. Cocks	528 0 0

For house and shop, for Mr. Eyles, Plashet-road, West Ham. Messrs. Hill & Fletcher, architects. No quantities:—

Cox	£732 0 0
Englo	525 0 0
Axtender	510 0 0
Salt	490 0 0
Baxter	479 0 0
England	463 0 0
Martin	460 0 0

For painting and repairs at the Licensed Victuallers' Schools, Kennington-lane. Mr. H. I. Newton, architect:—

Veare	£216 0 0!
Pickersgill Bros.	157 0 0
Cook	159 0 0
Walker (accepted)	98 0 0!

For additions and alterations to the Salop and Montgomery Counties and Borough of Wenlock Lunatic Asylum, Bicton, Shrewsbury. Mr. Thomas Groves, architect. Quantities by the architect and Messrs. Strudwick & Mennie:—

		Old Materials.
Thos. Boyce, London	£64,870	£200
Martin, Wells, & Co., Aldershott	61,000	500
J. Jones & Sons, Sedgley	59,000	160
Stevens & Bastow, Bristol	57,000	600
Josh Wood & Sons, Worcester	56,704	945
G. H. Marshall, Birmingham	54,368	1,276
H. Bennett, Rugby	54,150	800
John Grosvenor, Tunstall	53,500	444
R. Price, Shrewsbury	53,500	725
W. & J. Webb, Birmingham	52,900	710
Treasure & Son, Shrewsbury	52,135	574
E. C. Howell & Son, Bristol	52,000	260
H. Lovatt, Wolverhampton	50,666	666
W. Holdsworth, Bradford	50,490	500
J. Parnell & Son, Rugby	50,412	700
E. Gabbutt, Liverpool	49,990	690
P. Horsman & Co., Wolverhampton	49,540	580
John Garlick, Birmingham	48,300	600
J. Wood & Son, Leicester	47,605	528
Samuel Warburton,* Manchester	46,000	575

* Accepted.

Mr. John Laidlaw, of Boyson-road, Camberwell, was appointed clerk of the works, under the direction of the architect, out of 115 applicants.

For sinking an artesian well and erecting pumps, engine, and gearing at St. Luke's Workhouse, for the Guardians of the Poor of the Holborn Union. Messrs. H. Saxon Snell & Sons, architects:—

	Well.	Pumps.	Engine, &c.
Benham & Sons	£2,274 16 3	£480 0 0	£495 0 0
Tilley	1,662 14 4	470 10 6	467 17 6
Pontifex & Wood	1,599 7 6	456 10 0	448 0 0
Potter	1,340 18 0	379 0 0	556 0 0
May (accepted)	1,369 16 10	540 0 0	357 19 0

Additional if pumps are required to be fixed below water line and headings run 200 ft. into chalk:—

Benham & Sons	£2,304 10 0!
Tilley	945 11 8
May	770 6 8
Pontifex & Wood	520 6 0
Potter	477 8 0!

For alterations and additions to Christ Church Schools, Derby. Mr. J. R. Naylor, architect. Quantities supplied:—

S. Bakewell, Derby	£1,210 0 0
R. Wood, Derby	1,175 0 0
J. Wood, Derby	1,165 19 6
A. Smith, Derby	1,077 0 0
G. Hewitt, Derby (accepted)	963 0 0

For the erection of an Independent Methodist Chapel to be erected in Ella-street, Pendleton. Messrs. Maxwell & Tuke, architects:—
Southern & Son (accepted).

For alterations and additions to 57, Foregate-street, Worcester, for Mr. James Gaunt. Mr. A. Hill Parker, architect:—

J. Wood & Sons	£797 0 0
F. Wells & Son	717 0 0
J. H. Beard	700 0 0
J. Bourne	620 0 0
Dixon Bros., Worcester (accepted)	585 0 0
Hot-Water Apparatus.	
Greenhow	£52 10 0

For villa residence, Barbourne, Worcester, for Mr. H. A. Firkins. Mr. A. Hill Parker, architect:—
F. Wells & Son (accepted on schedule of prices).

For two chalet residences at Harrow-on-the-Hill. Mr. J. T. Walford, architect. Quantities supplied:—

	Houses.	Stables.	Drains.	Extra for Pitch Pine.
L. & H. Roberts	£9,212	£1,211	£150	£430
Colls & Sons	9,040	1,130	150	430
Hall, Beddall, & Co.	8,966	1,027	140	410
Patrick & Son	8,350	948	140	245
Kirk & Randall	7,475	849	103	320
McLachlan & Sons	7,321	894	94	247
Waterman	7,185	853	76	340

For Worsley Main Drainage. Contract No. 7, being the extension of the main sewer in Worsley-road, near Broad Oak, for the Barton-upon-Irwell Sanitary Authority. Quantities supplied by the engineer, Mr. John Price:—

James Jackson, Walkden	£110 0 0
Edmund Bird, Chorlton	98 13 0
James Oakes, Kearsley (accepted)	84 8 5

Accepted for Flixton house-connexions. Contract No. 6, being the drainage of certain houses in the township of Flixton, for the Barton-upon-Irwell Sanitary Authority. Mr. John Price, surveyor:—
Edmund Bird, Chalton.

Accepted for Urmston house-connexions. Contract No. 7, being the draining of certain houses in the township of Urmston, for the Barton-upon-Irwell Sanitary Authority. Mr. John Price, surveyor:—
Samuel Cowburn, Hindley.

For erecting an additional building at pianoforte factory, Grafton-road, Kentish Town, for Messrs. Brinsmead & Son. Mr. C. E. Evans, architect. Quantities by Mr. Geo. Fleetwood:—

Gregory & Bence	£2,888 0 0
Outhwaite & Son	2,444 0 0
Roberts Bros.	2,436 0 0
Grover	2,347 0 0
Perkins	2,347 0 0
Higgs & Hill	2,280 0 0
Toms	2,119 0 0
Manley	2,050 0 0

For decorations at Craven-hill, for Mr. J. Davis. Mr. W. Beckham Witherington, architect:—

Nesotti & Co.	£1,274 6 0
Shoolbred & Co.	950 10 0
W. B. Simpson & Sons	898 5 0

For new reservoir, for the Horsham Local Board:—

Harrison	£2,990 0 0!
C. Dickenson	2,600 0 0
Dibley	2,400 0 0
Crockett	2,059 0 0
J. Potter	2,025 0 0
T. B. Haylor	1,920 0 0
E. Etheridge	1,919 0 0
Chamberlain	1,913 0 0
Leppish & Lutterly	1,850 0 0
Ford & Everett	1,797 0 0
P. Peters	1,777 0 0
Strachan & Co.	1,720 0 0
Redford	1,694 0 0
Etheridge Bros.	1,645 0 0
Pannett Bros.	1,425 0 0
T. Skinner (accepted)	1,214 0 0!

For extension of St. Paul's-road Board Schools. Mr. E. R. Robson, architect. Quantities by Messrs. Northcroft, Son, & Neighbour:—

H. Hart	£4,459 0 0
F. & F. J. Wood	4,287 0 0
T. Boyce	4,239 0 0
B. E. Nightingale	4,075 0 0
Kirk & Randall	3,983 0 0
S. J. Jerrard	3,973 0 0
W. Oldrey	3,858 0 0
Atherton & Latta	3,500 0 0
J. F. Sargeant	3,498 0 0
C. Cox	3,394 0 0

For enlargement of St. Clement-road Board Schools. Mr. E. R. Robson, architect. Quantities by Mr. Thornton Green:—

J. Rankin	£3,992 15 0
Lathey Bros.	3,985 15 0
W. Oldrey	3,817 0 0
C. W. Reading	3,744 0 0
G. S. Pritchard	3,606 15 0
W. Tongue	3,673 0 0
Higgs & Hill	3,595 0 0
C. Wall	3,532 0 0

For rebuilding Nos. 1, 29, and 30, Church-way, Somers Town, for Mr. Geo. Carter. Messrs. J. Saville & Son, architects:—

Titmas	£2,075 0 0
Richardson	2,050 0 0
Hayworth	1,976 0 0
Stephen Bros.	1,968 0 0
Nightingale	1,943 0 0
Wall Bros.	1,836 0 0
Shurmur	1,791 0 0
Lamble	1,787 0 0
Royal (accepted)	1,779 0 0

For the sanitary work, alterations, and decorator's work, for the Granville Hotel, Ramsgate:—
J. & J. Greenwood, London (accepted) £2,353 0 0

For new road and sewers, for the proprietors of the Aldrington Estate, West Brighton. Mr. Arthur Lewis, surveyor:—

J. Harrison, Brighton	£866 0 0
A. Oliver, Brighton	800 0 0
H. Woodhams, Brighton	718 0 0
J. Longley, Worth (accepted)	700 0 0

For warehouse, for Messrs. Faudel Phillips & Sons, between Queen's Head-passage and Lovell's-court, City. Mr. Thos. Chamberlain, architect. Quantities by Mr. S. B. Wilson:—

Patrick & Son	£10,085 0 0
Holland & Hannen	10,023 0 0
Lister	9,968 0 0
Morter	9,895 0 0
Ashby Bros.	9,850 0 0
Wm. Brass	9,567 0 0
Fish, Prestige, & Co.	9,540 0 0
Hall, Beddall, & Co.	9,145 0 0
Richard Conder	9,100 0 0

For new sewers, &c., in New-street, Bishopsgate, King's Arms-yard, and Trump-street, for the Honourable the Commissioners of Sewers of the City of London:—

Botterill	£6,542 0 0!
Mears	2,944 0 0
Crockett	2,650 0 0
Mowlem & Co.	2,213 0 0
Ford & Everett (accepted)	2,135 0 0!

For erecting three shops and office at Enfield, for Mr. H. Clarke. Mr. John Groom, architect. Quantities by Mr. M. W. King:—

Pocock	£1,790 0 0
Saver	1,660 0 0
Fairhead	1,528 0 0
Hampton	1,505 0 0
Mattock Bros. (accepted)	1,493 0 0

For the erection of tobacco warehouse, at Portsea, for Messrs. Cavender. Mr. A. H. Bone, architect:—

Shurmur, London	£4,385 0 0
Cooper, Portsmouth	4,355 0 0
White, Portsmouth	4,335 0 0
Evans, Portsmouth	4,330 0 0
Burbridge, Portsmouth	4,192 0 0
Light, Portsmouth	4,110 0 0
Ward, Portsmouth	4,080 0 0
Lewis, Portsmouth	3,990 0 0
Hayter, Portsmouth	3,980 0 0
Stevens, Southampton (accepted)	3,740 0 0

For the erection of an Orkney Combination poor-house, Kirkwall. Mr. T. S. Peace, architect. Quantities by Mr. Andrew Lawrie:—

Wm. Robertson, Stromness	£2,776 0 0
Peter Sheern, Kirkwall	2,492 0 0
Jas. Drever, Stromness	2,396 4 5
Robert Cumming, Kirkwall	2,314 4 0
Wm. Firth, Kirkwall (accepted)	2,308 0 0

For providing and fixing Venetian blinds to infirmary, &c., at Mitcham Schools, for the Guardians of the Poor of the Holborn Union. Messrs. H. Saxon Snell & Sons, architects:—

G. Haskins	£136 0 0!
S. Haskins Bros.	113 18 0
James & Son (accepted)	73 4 9!

For the erection of new offices for the Portland Estate, Queen Anne-street. Contract 1, foundations. Mr. C. Fowler, architect. Quantities by Mr. H. Lovegrove :—

J. Woodward	£355	0	0
Williams & Son	345	0	0
R. Conder	327	0	0
Bangs & Co.	300	0	0
B. E. Nightingale (accepted)	297	0	0

For the erection of new Sunday-schools, Banbury, Oxon. Mr. Chas. Bell, architect. Quantities by Mr. H. Lovegrove :—

Smith	£4,444	0	0
Orchard	3,999	0	0
Davis	3,990	0	0
Kinglee	3,948	0	0
Ireson	3,940	0	0
W. Jones, Gloucester	3,790	0	0
Kimberley (accepted)	3,772	0	0

For the erection of a Wesleyan school chapel at Gospel Oak. Mr. Chas. Bell, architect. Quantities by Mr. H. Lovegrove :—

Brass	£2,443	0	0
Goodman	2,398	0	0
Holliday & Greenwood	2,249	0	0
Allen & Sons	2,242	0	0
Manley	2,237	0	0
Gould & Brand	2,193	0	0
Gregar	2,179	0	0
Toms	2,174	0	0
Steed Bros.	2,166	0	0
Scrivener (accepted)	2,078	0	0

For alterations to the Whale Inn, Canal-side, Swindon New Town. Mr. W. Drew, architect :—

Webb	£378	0	0
Phillips & Powell	360	0	0
Thomas	345	0	0
Wiltshire	334	15	0
Looker	328	10	0
Henley	323	0	0
Barrett (accepted)	322	10	0

For building factory, Long-walk, Bermondsey-square, for Mr. John Feaver. Messrs. G. Elkington & Son, architects :—

Hind	£5,679	0	0
Hoar & Son	4,774	0	0
J. & J. Greenwood	4,496	0	0
Jerrard	4,473	0	0
Gregar	4,289	0	0
Lawrance	3,981	0	0
Tarrant & Son	3,949	0	0

For stables, for Mr. Simmonds, Forest-gate. Mr. J. T. Wesley, architect :—

Shurmur	£179	0	0
Taylor & Parfitt	159	0	0
Palmer	155	0	0
Hearle & Son (accepted)	148	0	0

For the erection of schools, Matthias-road, for the School Board for London. Mr. E. R. Robson, architect :—

Reading	£11,362	0	0
Grover	11,239	0	0
Wall Bros.	11,187	0	0
E. Lawrence	11,089	0	0
W. Brass	11,056	0	0
Atherton & Latta	11,050	0	0
Scrivener & Co.	10,989	0	0
W. Shurmur	10,989	0	0
C. Cox	10,987	0	0
Sargeant	10,750	0	0
T. Boyce	10,583	0	0

For new road and pipe sewers at Wandsworth :—

Killingback	£899	0	0
Pizzey	899	0	0
Green	885	0	0
Mears	750	0	0
Ford & Everett	694	0	0
Nowell & Robson	670	0	0

For brick tank, two gas engines, and engine-shed, for the Acton Local Board :—

Ford & Everett	£3,243	0	0
Bell	2,650	0	0
Cookard & Co.	2,582	0	0
Bolton	2,150	0	0
Dickson	2,055	0	0
Pizzey	2,050	0	0
Nowell & Robson	2,025	0	0
Finnigan (accepted)	1,694	0	0

For new shop fronts, 69 and 71, Finsbury-pavement, and 2 and 3, Little Moorfields, for Mr. R. Morley. Mr. W. Seckham Witherington, architect :—

Lascelles	£680	0	0
Russell	582	0	0
Scrivener & Co.	553	0	0
Larke & Son	540	0	0

For repairs, alterations, and re-decorating 7, Russell-square, for Mr. J. T. Smith. Mr. Frank Goldring, surveyor :—

John Grover	£501	0	0
Emery	464	0	0
Baber	448	0	0
Bennett	412	0	0
Conway (accepted)	387	10	0

For the erection of a mission church at Acton Green, for the Rev. A. H. Dunn, M.A. Mr. Edward Monson, jun., architect. Quantities supplied :—

Geo. Hooper, Acton	£1,380	15	1
C. G. West, Acton	1,323	13	0
John Parker, Acton	1,298	0	0
Penny & Durrant, Ealing	1,259	0	0
M. W. Rowles, Acton	1,245	0	0
Thos. Brunsden, New Brentford	1,195	0	0
Wilkinson, Bros., Finsbury Park	1,173	0	0
Chas. Maton, Kew	1,123	0	0
Joseph Dorey, Old Brentford	1,084	0	0
John Cardus, Acton (accepted)	994	0	0

For building four houses, Queen Elizabeth's Walk, Stoke Newington, for Mr. J. E. Sutton. Mr. C. H. Worley, architect. Quantities by Mr. Fife :—

Mattock, Bros.	£3,020	0	0

For building new shops adjoining the Sir John Lawrence, New Southgate; and alterations and additions to the Railway Hotel, Church-end, Finchley, for Mr. C. Mackness. Mr. W. R. Williams, architect :—

Royal (accepted).

Roads, Lewisham.—Mr. Pound says his tender was 2,490*l.*, not 2,040*l.*

Alterations at Kingston.—Name of lowest tenderer is Capsey, not Copsey.

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